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THE NICHOLS  
HERRESHOFF  
INCINERATOR

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# THE NICHOLS HERRESHOFF INCINERATOR

*for the disposal of*  
**SEWAGE SOLIDS**  
*and*  
**INDUSTRIAL WASTES**

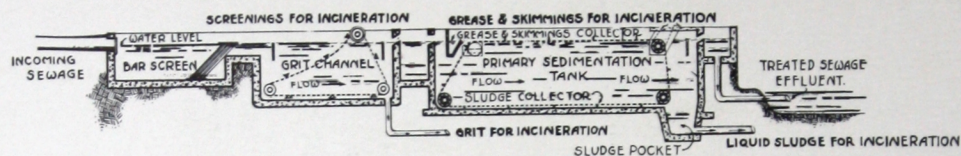
BULLETIN No. 210

**NERCO**  
*Nichols Engineering and Research Corp.*

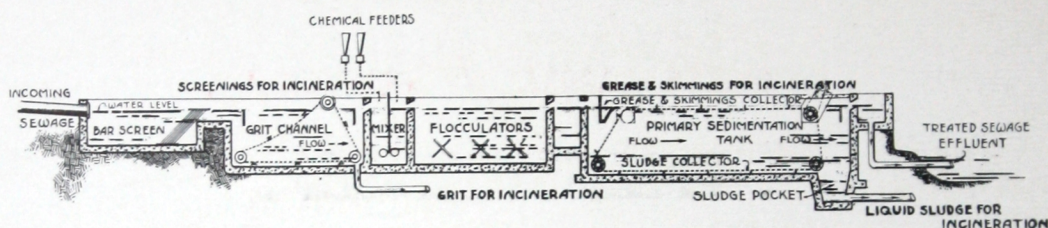
60 WALL TOWER  
NEW YORK, N. Y.

UNIVERSITY TOWER  
MONTREAL, P. Q.

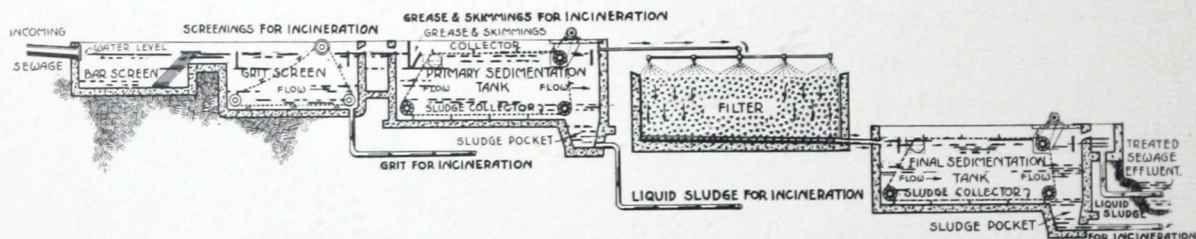




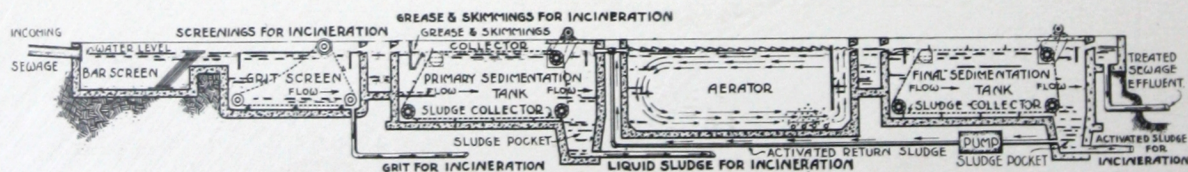
PLAIN SEDIMENTATION



CHEMICAL PRECIPITATION



TRICKLING FILTER



FLOW DIAGRAMS.

ACTIVATION

NICHOLS ENGINEERING & RESEARCH CORP.  
NEW YORK, CITY, N.Y.



## **SEWAGE PLANT WASTES**

The function of modern sewage disposal is to collect and purify sewage solid matter and to discharge an effluent which will not cause pollution.

Solid matter collected by most sewage plants consists of screenings, grit, scum, grease and sewage sludge.

Disposal of these waste materials, with their high percentage of putrescible organic matter is a prerequisite of modern sanitation and essential to the safeguarding of public health.

## **COMPLETE DISPOSAL BY INCINERATION**

Incineration of sewage solids destroys putrescible organic matter by oxidation at high temperature. The residue is a clean, mineral ash.

## **HISTORY OF INCINERATION**

The first successful sewage solids incinerator, handling the entire output of a full size municipal sewage plant was installed at Dearborn, Michigan, during the latter part of 1934. This was a 16 foot 9 inch diameter six hearth mechanically rabbled NICHOLS HERRESHOFF Incinerator. From the very start, the operation was highly successful and this incinerator quickly demonstrated its dependability, low cost of operation and freedom from smoke and odor nuisance. It won the approval of many Sanitary Engineers throughout the world.

It is an interesting fact that much of the equipment used today in sewage treatment was developed for and proven in the mining and metallurgical industries. The NICHOLS HERRESHOFF Incinerator is no exception. The first NICHOLS HERRESHOFF Furnace was installed over 50 years ago at the Nichols Chemical Company plant in New York City. Curiously enough, one of the reasons for the development of this first furnace was to overcome damage to vegetation by sulphur gases from roasting ores.

This first ore roaster was approved by Metallurgical and Chemical Engineers and rapidly replaced roasters of various types, which had formerly been used. During the succeeding fifty years, many improvements have been made to meet changing conditions and to extend the application of the furnace to many fields of drying, ore roasting, calcining of lime sludges, disposal of industrial wastes, incineration of sewage solids and other uses too numerous to mention.



Since the first NICHOLS HERRESHOFF Sewage Solids Incinerator was completed in 1934, thirty-five NICHOLS HERRESHOFF Incinerators have been installed in municipalities listed below:

### SEWAGE SOLIDS INCINERATORS INSTALLED SINCE 1934

City	Year Installed	No. of Units	Type of Sludge	Engineer
Dearborn, Mich.	1934	1	Raw Plain Sedimentation and Chemically Precipitated.	City of Dearborn
Kokomo, Ind.	1936	1	Digested Primary and Trickling Filter.	Russell B. Moore Co.
Auburn, N. Y.	1936	1	Raw Plain Sedimentation or Chemically Precipitated.	Thomas F. Bowe
LaPorte, Ind.	1936	1	Digested Primary and Trickling Filter.	Russell B. Moore Co.
Colorado Springs, Colo.	1936	1	Digested Plain Sedimentation or Chemically Precipitated.	Burton Lowther
New Britain, Conn.	1936	1	Raw-Guggenheim Bio-Chemical.	Fuller & McClintock
Elmira, N. Y.	1936	1	Raw Plain Sedimentation or Chemically Precipitated.	Remington & Goff
Kaukauna, Wisc.	1937	1	Raw Plain Sedimentation or Chemically Precipitated. Also Ground Garbage.	Greeley & Hansen
Cleveland, Ohio (Westerly Plant)	1937	2	Digested Plain Sedimentation.	Gascoigne & Associates
Middletown, Conn.	1937	1	Digested Plain Sedimentation.	Thomas F. Bowe
Minneapolis-St. Paul, Minn.	1938	3	Raw Plain Sedimentation or Chemically Precipitated.	Minneapolis-St. Paul Sanitary District
Greece, N. Y.	1938	1	Raw Primary and Activated Sludge. Garbage Future.	Howard S. Thomas
Cleveland, Ohio (Southerly and Easterly)	1938	4	Digested Primary, Activated and Trickling Filter.	Gascoigne & Associates



## SEWAGE SOLIDS INCINERATORS INSTALLED SINCE 1934

City	Year Installed	No. of Units	Type of Sludge	Engineer
Conshohocken, Pa.	1938	1	Raw Plain Sedimentation or Chemically Precipitated and Ground Garbage.	William A. Goff
Barberton, Ohio	1938	1	Raw Plain Sedimentation or Chemically Precipitated.	Barstow & LeFeber
Columbus, Ohio	1938	1	Digested Primary and Activated.	City of Columbus
Wayne County Board Wyandotte, Mich.	1939	1	Raw and Digested Plain Sedimentation.	Hubbell, Roth & Clark, Inc.
Detroit, Mich.	1939	4	Raw and Digested Plain Sedimentation.	City of Detroit
Ashland, Ohio	1939	1	Raw Primary and Trickling Filter.	E. D. Barstow
Anderson, Ind.	1939	1	Raw-Guggenheim Bio-Chemical. Garbage Future.	Russell B. Moore Co.
Thompsonville, Conn.	1939	1	Raw Plain Sedimentation.	Thomas F. Bowe
Piqua, Ohio	1939	1	Raw Plain Sedimentation. Garbage Future.	Hoover, Montgomery & Allton
New Haven, Conn. (Boulevard Plant)	1940	1	Digested Plain Sedimentation.	Gascoigne & Associates
Dayton, Ohio	1940	1	Digested Primary and Trickling Filter.	Metcalf & Eddy
New Haven, Conn. (East Street Plant)	1940	1	Raw Plain Sedimentation.	Gascoigne & Associates
Rock Island, Ill.	1940	1	Digested Plain Sedimentation and Ground Garbage.	Consoer, Townsend & Quinlan

The number of NICHOLS HERRESHOFF Incinerators installed in the last few years speaks for their dependability and economy in operation.

As each problem is different, we invite your inquiries regarding any municipal and industrial waste disposal problems you may have.



## **APPLICATIONS TO VARIOUS METHODS OF SEWAGE TREATMENT**

NICHOLS HERRESHOFF Incinerators are now serving municipalities having populations up to 2,000,000.

These installations are successfully incinerating sludges produced by EACH OF THE BASIC METHODS OF SEWAGE TREATMENT, such as plain sedimentation, activation, trickling filter, chemical precipitation, sludge from bio-chemical sewage treatment, sludge from effluent filters and various modifications of these. Some are digested; some are raw sludges.

## **INFLUENCE OF INCINERATION ON PLANT DESIGN**

Incineration exerts a fundamental influence over the basic design of sewage treatment plants.

The area required for mechanical dewatering and incinerating equipment is far less than that required for drying beds. Compact, attractive looking plants, which use incineration for sludge disposal, can be centrally located. This reduces land and sewer construction costs to a minimum.

A glance at the list of NICHOLS HERRESHOFF Incinerator installations on pages 4 and 5 will show that in a number of cases raw sludge, as drawn from the settling tanks, is dewatered and incinerated without any intermediate treatment. Raw sludge filters at practically the same rate as digested sludge and produces a cake of about the same moisture content. It burns even more readily than digested sludge and, in general, requires little or no auxiliary fuel. Equipment for incinerating raw sludge filter cake is also simpler than that required for digested sludge.

Incineration provides a ready means for disposal of grit, screenings and scum.

Grit chambers may be designed to collect the maximum quantity of grit without consideration for entrained organic matter since this is entirely destroyed during incineration leaving an inert, mineral residue. The ability to settle heavy organic particles together with grit in the grit chambers contributes to the efficiency of the later treatment process. Grit washing, to remove organic matter, is unnecessary.

Screenings and scum, both potential nuisances around treatment plants, are being successfully incinerated and completely disposed of in NICHOLS HERRESHOFF Incinerators.



## **INCINERATION THE ONLY COMPLETE METHOD OF SLUDGE DISPOSAL**

Incineration is the only method of sludge disposal which produces a non-putrescible mineral residue.

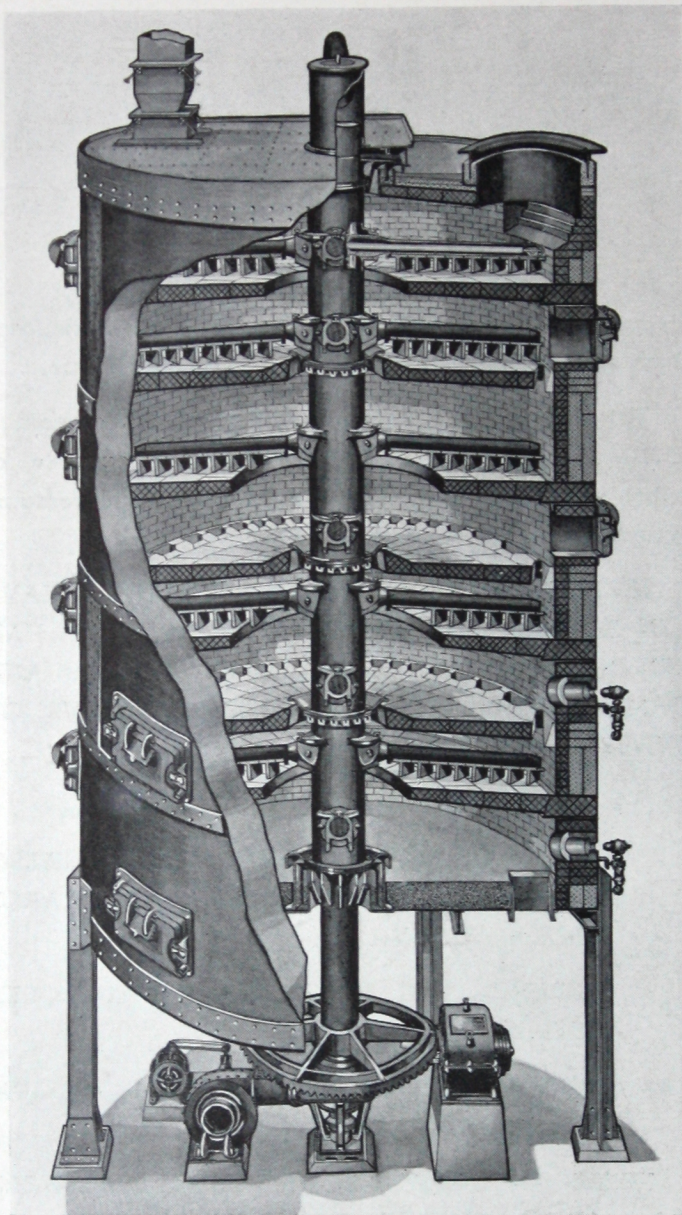
The end product from all other methods of sludge handling still contains organic material capable of further putrefaction, the disposal of which still remains a major problem.

NICHOLS HERRESHOFF INCINERATORS HAVE BEEN INSTALLED AT EXISTING PLANTS WHICH HAD BEEN IN OPERATION FOR A NUMBER OF YEARS AND FORMERLY EMPLOYED THESE OTHER MEANS OF SLUDGE HANDLING:

1. LAGOONING OF LIQUID SLUDGE.
2. BARGING LIQUID SLUDGE TO SEA; ALSO PUMPING LIQUID SLUDGE INTO LARGE BODIES OF WATER.
3. DRYING BEDS, BOTH OPEN AND ENCLOSED TYPES.
4. TRUCKING FILTER CAKE FROM VACUUM FILTERS TO DUMPS.

THESE INCINERATOR INSTALLATIONS WERE MADE AFTER CAREFUL CONSIDERATION OF ALL FACTORS BY LEADING SANITARY ENGINEERS, WHO CONCLUDED THAT COMPLETE DISPOSAL BY INCINERATION WAS JUSTIFIED EVEN THOUGH THE CAPITAL INVESTMENT, LAND AND EQUIPMENT FOR OTHER METHODS OF SLUDGE HANDLING ALREADY EXISTED.



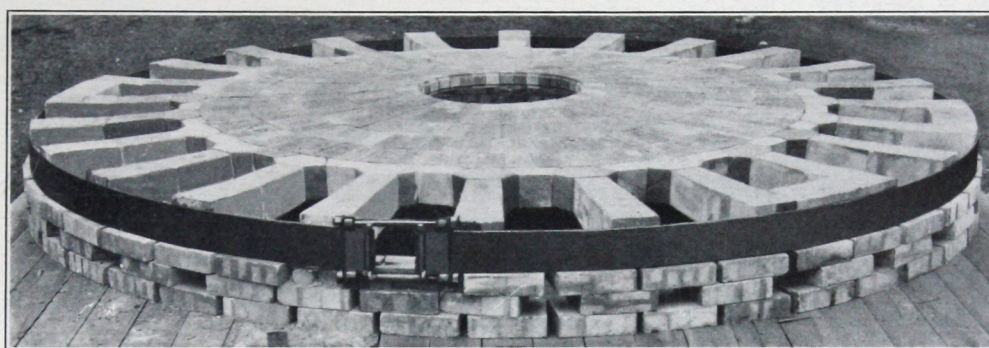


### THE NICHOLS HERRESHOFF INCINERATOR

**DESIGN** — THE INCINERATOR IS A MULTIPLE HEARTH, MECHANICALLY RABBLED FURNACE. A CYLINDRICAL STEEL SHELL, MOUNTED ON COLUMNS AND LINED WITH A WALL OF INSULATION AND FIRE BRICK, SUPPORTS BRICK HEARTHS ONE ABOVE THE OTHER. A VERTICAL AIR COOLED ROTATING SHAFT IN THE CENTER OF THE FURNACE TURNS HORIZONTAL ARMS ABOVE EACH HEARTH. TEETH ATTACHED TO THESE ARMS CONTINUOUSLY STOKE OR RABBLE THE SLUDGE.



**HEARTH** — Conical arches or hearths constructed of special shaped fire brick blocks are laid one above the other. The top hearth has one opening through which sludge is fed by means of a feeder designed to admit sludge without allowing excessive quantities of air to enter into or gas to escape from the incinerator.



The first internal hearth has a large opening at the center leaving an annular shaped port around the center shaft for the passage of sludge and gas. This annular opening at the center is also provided in the third, fifth and other odd numbered hearths, which are known as "IN" discharge hearths.

The second, fourth and other even numbered hearths have drop holes located around the periphery just inside the furnace walls and are known as "OUT" discharge hearths. The bottom hearth has a single port at the periphery through which ash is automatically discharged.

**CENTER SHAFT** — The center shaft, which passes vertically through the center of the furnace, is made in sections generally including only one "IN" and one "OUT" hearth for ease in construction or repair. This also affords a ready means for increasing furnace capacity with additional hearths, if later desired, without increasing floor space.



The shaft is supported by a step bearing, running in a bath of oil and is held in alignment by a ring bearing at the top. It is rotated by a system of reducing gears, a belt drive and step pulleys being provided for ready control of the speed of rotation. All bearings and gears are located outside of the furnace.

**RABBLE ARMS** — The rabble arms slide into arm sockets in the center shaft and are held in place by an alloy pin. The pin is readily removable from outside the furnace and an arm can be removed and replaced through the furnace door without cooling down the furnace or interrupting incineration for more than a few minutes.



Each rabble arm is constructed with a longitudinal dovetail groove along the under side, which receives the rabble teeth.



**COMBUSTION AIR PREHEATER**— The center shaft and rabble arms are air cooled. The air, thus preheated in cooling the shaft and arms, is admitted to the incinerator for combustion purposes.

**RABBLE TEETH**— Plows or rabble teeth are attached to the underside of the rabble arms by means of dovetail hangers at the top, which slide into the dovetail groove in the arm from the outer end. A pin at the end of the arm prevents the teeth from moving during operation and can readily be removed to change teeth through the furnace door with only a momentary interruption of incineration.



Approximately every 20 seconds, each particle of sludge within the incinerator is turned over exposing a fresh surface for drying or burning and is gradually moved across the hearths and downward through the incinerator.

**GAS FLOW**— The gases, produced by combustion of the sewage solids on the lower hearths, pass upward through the incinerator in counter-current to the flow of sludge and are exhausted to the atmosphere by natural draft through a stack and breeching connecting with the side or top of the uppermost hearth.

Drying of the incoming sludge is accomplished by the exhaust gases as they pass across the upper hearths. The zone of highest temperature is that at which hydrocarbons are volatilized and burnt. The gases are completely deodorized at high temperature at this point within the incinerator. An excess of air is admitted at all times and thus complete combustion of solids and gases is assured with freedom from smoke and odor nuisance.

The large internal volume of the NICHOLS HERRESHOFF Incinerator and the large area of central and peripheral drop holes gives a well distributed, low velocity gas flow with consequent low capacity for carrying dust in suspension. The gases are turned at 180° in passing from hearth to hearth and thus come in intimate contact with wet sludge on the upper hearths. This wet sludge serves as an efficient dust arrester which collects the minute quantities of dust contained in the gases before they leave the incinerator.

**TEMPERATURE**— The temperature of gas and air at important points is measured by thermocouples located on the various hearths.

**POWER**— The only power requirement for an incinerator operating on natural draft is the power for rotating the center shaft and for the cooling air fan. Both of these require only small motors, the center shaft motor being 1½ H.P. and the cooling air fan motor also being 1½ H.P. for an incinerator serving a municipality of 25,000 population.

**ASH HANDLING**— Ash is automatically discharged from one ash outlet located on the bottom hearth and is readily conveyed and stored. It contains no volatile or putrescible matter and the fixed carbon averages below 2%. The major constituents are silica, alumina, calcium and iron.



### **CAPACITIES AND SIZES**

NICHOLS HERRESHOFF Multiple Hearth, Mechanically Rabbled Incinerators are made in a number of sizes which include any possible capacity ranges.

Of the existing NICHOLS HERRESHOFF Sludge Incinerator units, the largest individual incinerator has a capacity of over 300 tons wet feed per day and the smallest has a capacity of 3 tons wet feed or 1 ton dry solids per 8 hours' operation.

### **SIMPLICITY AND DEPENDABILITY**

- The NICHOLS HERRESHOFF Incinerator is a single, self-contained unit.
- Sewage sludge is fed in at the top, dried, incinerated and the ash automatically discharged at the bottom. There is no manual stoking; no complicated adjustments to be made. The operation is simple and straight-forward; requires a minimum of attention from the operator.
- The record of several thousand NICHOLS HERRESHOFF Furnaces installed throughout the world during the past fifty years is proof of their dependability and low cost of operation and maintenance.
- Practical experience has developed basic qualities of compact design, rugged construction and simple operating characteristics.
- Incineration of grit, screenings and scum with sewage sludge disposes of all sewage plant wastes in one operation.
- Multiple hearth construction permits flexibility in operation and wide capacity range.
- High heat duty alloys and refractories are selected for long life.
- Central shaft and rabble arms are air cooled.
- Rabble arms and teeth are quickly and easily replaceable from outside the incinerator without cooling.
- All bearings are located outside of the incinerator.
- Controlled combustion insures freedom from smoke and odor nuisances.



**GARBAGE — RUBBISH — REFUSE**

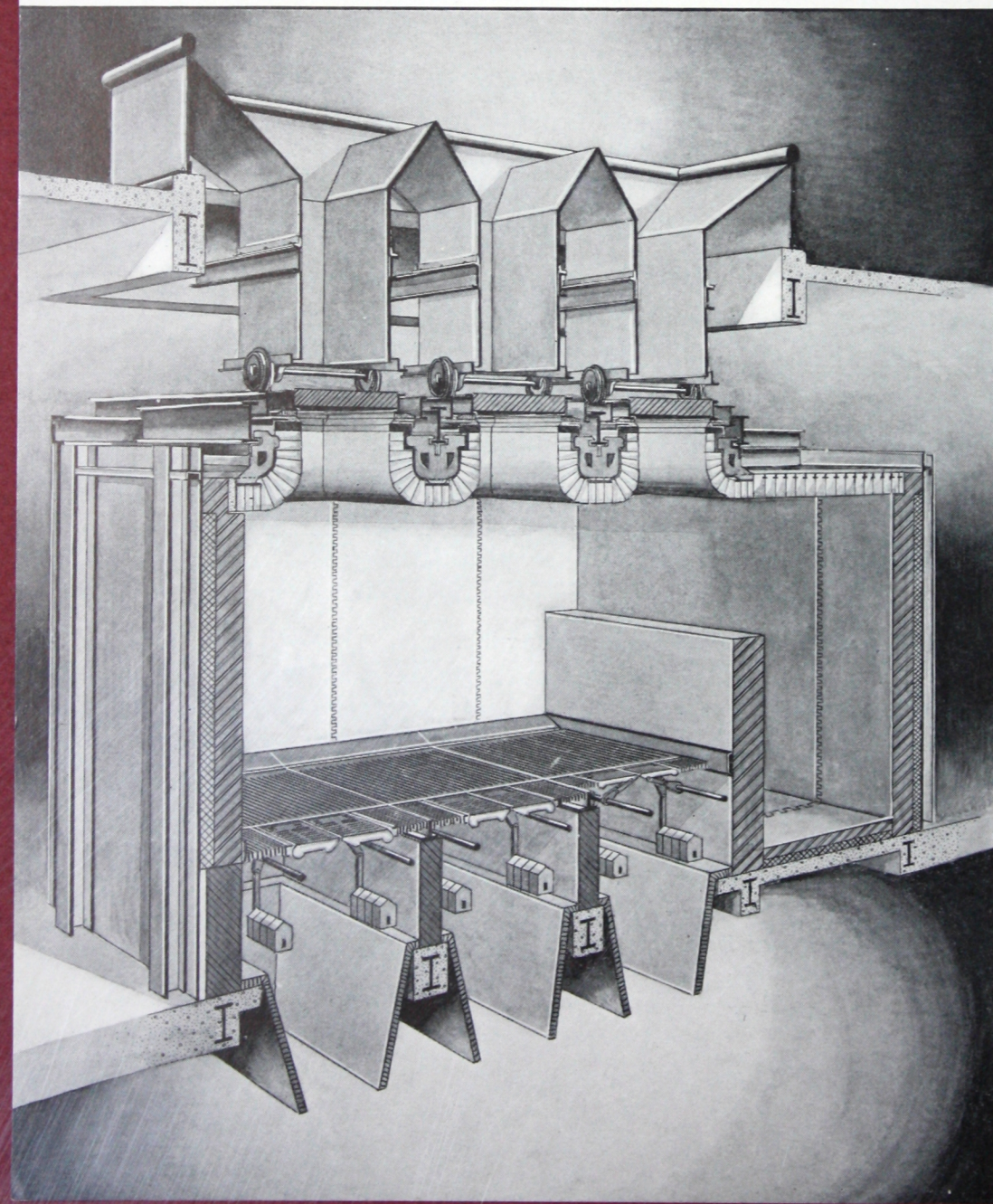
The disposal of refuse by incineration involves more than merely buying a furnace. For over-all plant efficiency and greatest economy, the incinerator must be engineered for the particular job.

In this respect it will be of interest to learn about our facilities and procedure for helping you, and about the three special types of NERCO Refuse Incinerators, as described in our new 30-page catalogue, entitled "Refuse Incineration."

If your municipality has a problem in REFUSE INCINERATION, take advantage of our facilities and experience. We can give you real help—and without obligation.

**NICHOLS INCINERATORS FOR INDUSTRIAL WASTES**

Incineration provides a complete and sanitary means for disposal of industrial wastes of all kinds.



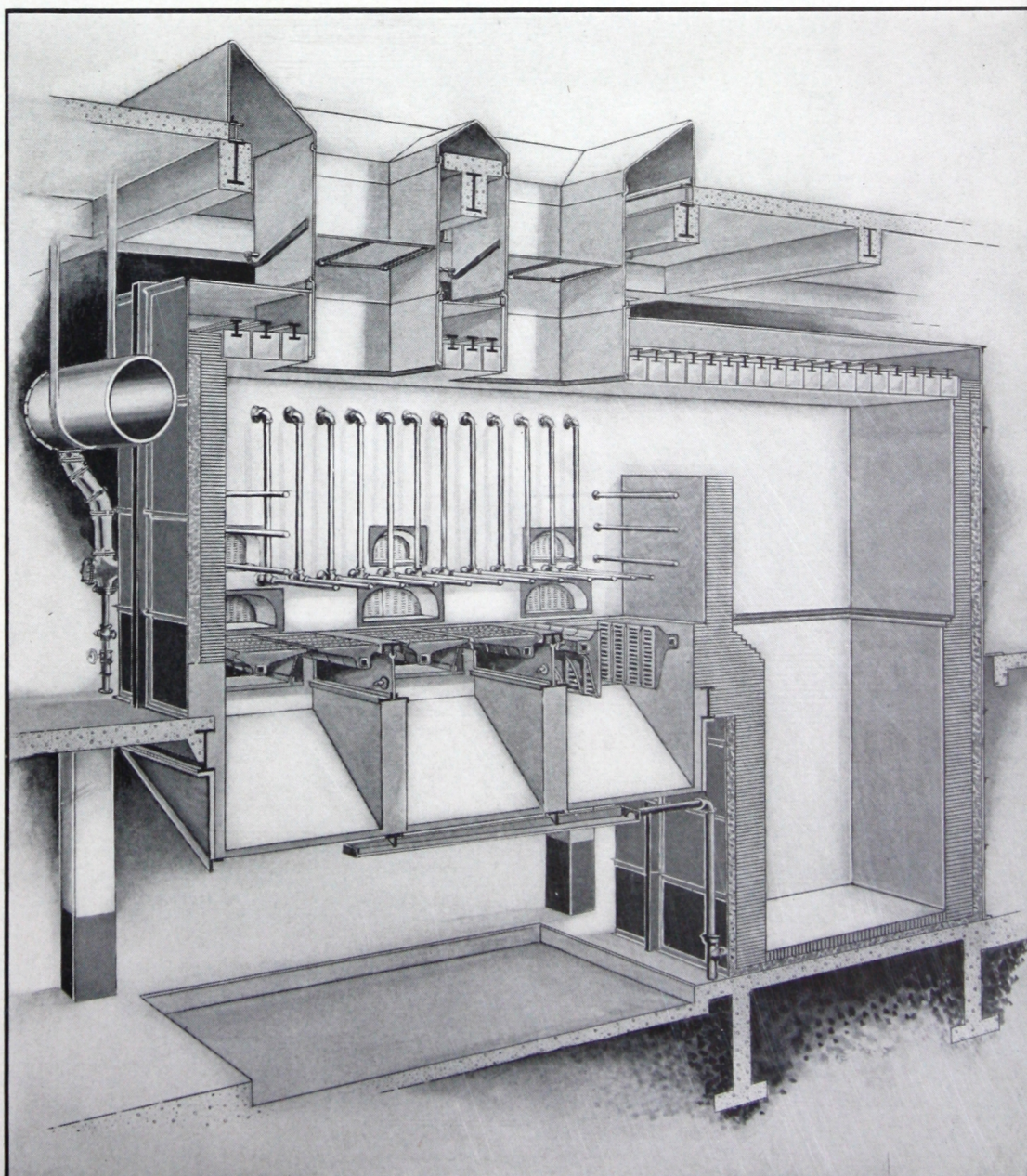
View of Continuous Grate Furnace showing Stationary Drying and Burning Grates.



Three types of Nichols Furnaces, the multiple hearth, the suspended basket grate and the continuous grate, are available. This wide range of furnaces enables a great variety of waste materials to be successfully incinerated.

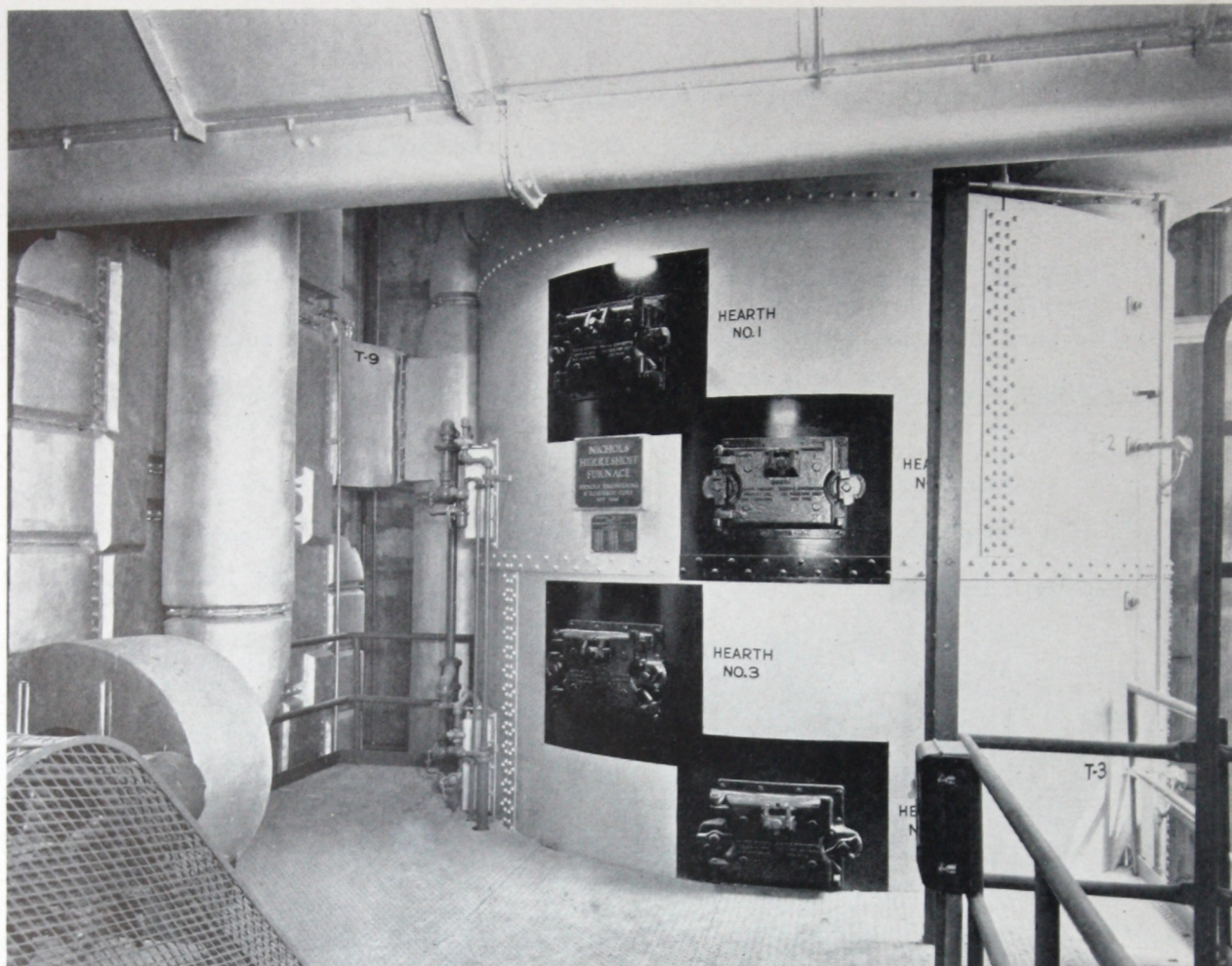
For fine mesh materials we suggest the use of our multiple hearth furnace. The suspended basket grate furnace is particularly applicable to coarse materials having high moisture contents, while, for coarse materials of medium or low moisture content, the continuous grate furnace is usually adequate.

The dependability and low cost of operating these furnaces has been demonstrated by a long record of satisfactory service.



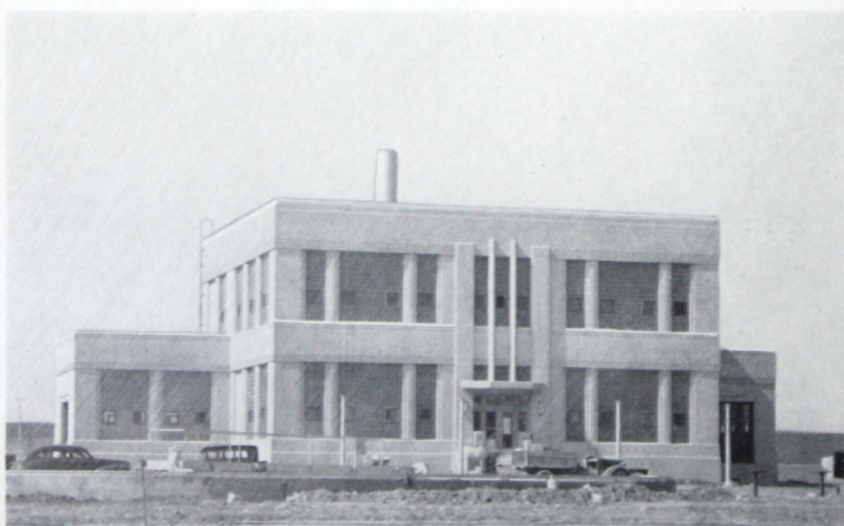
Nichols Basket Grate Furnace  
showing water-cooled Drying  
Basket and Burning Grates Below.





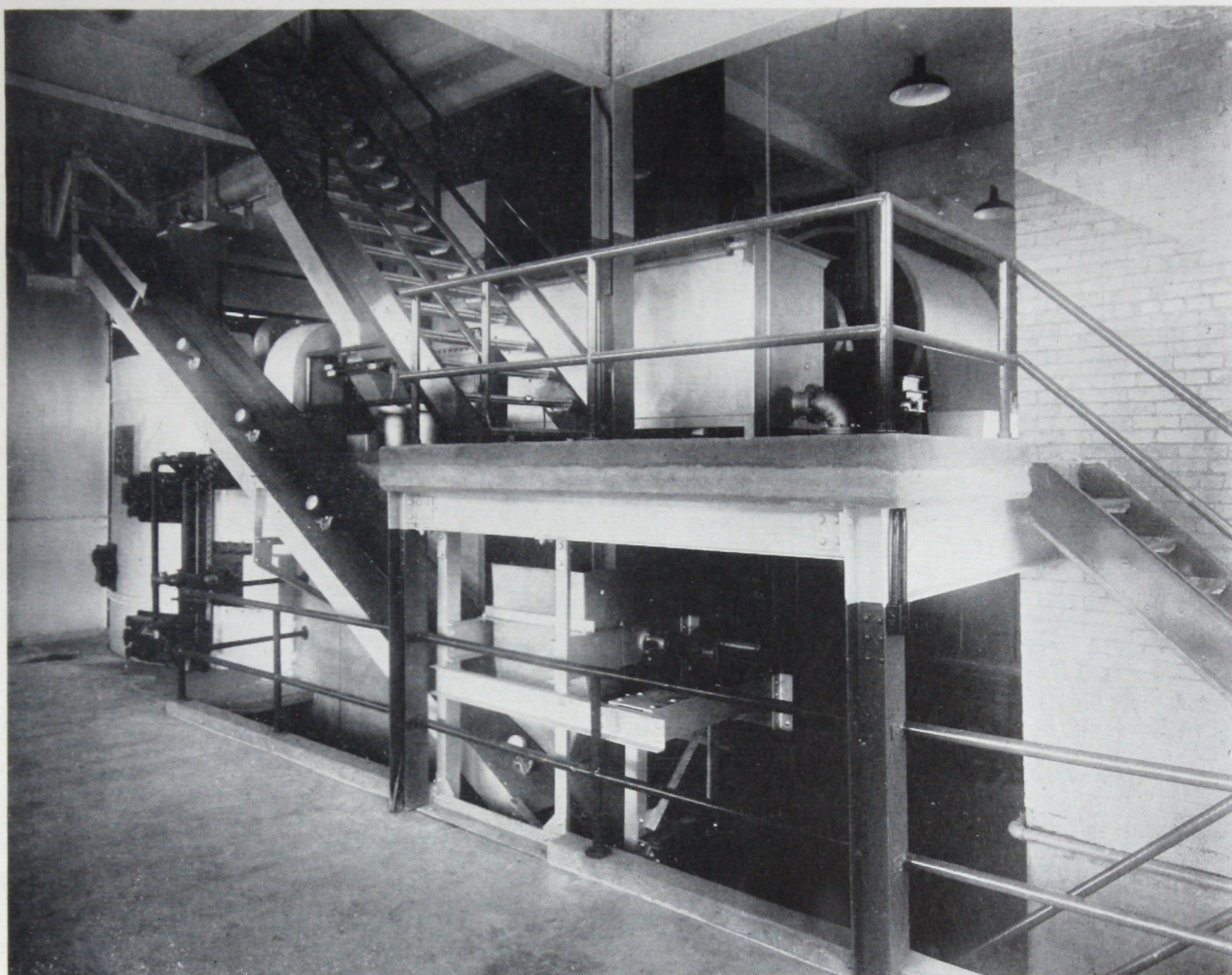
The high class workmanship typical of all NICHOLS HERRESHOFF Incinerators is exempli-

fied by this 14'-3" diameter, eight hearth installation at Anderson, Indiana.



The Anderson, Indiana, Sewage Disposal Plant here shown incorporates one NICHOLS HERRESHOFF Incinerator for disposal of raw sludge, produced by the Bio-Chemical treatment of sewage from a population of 40,000.





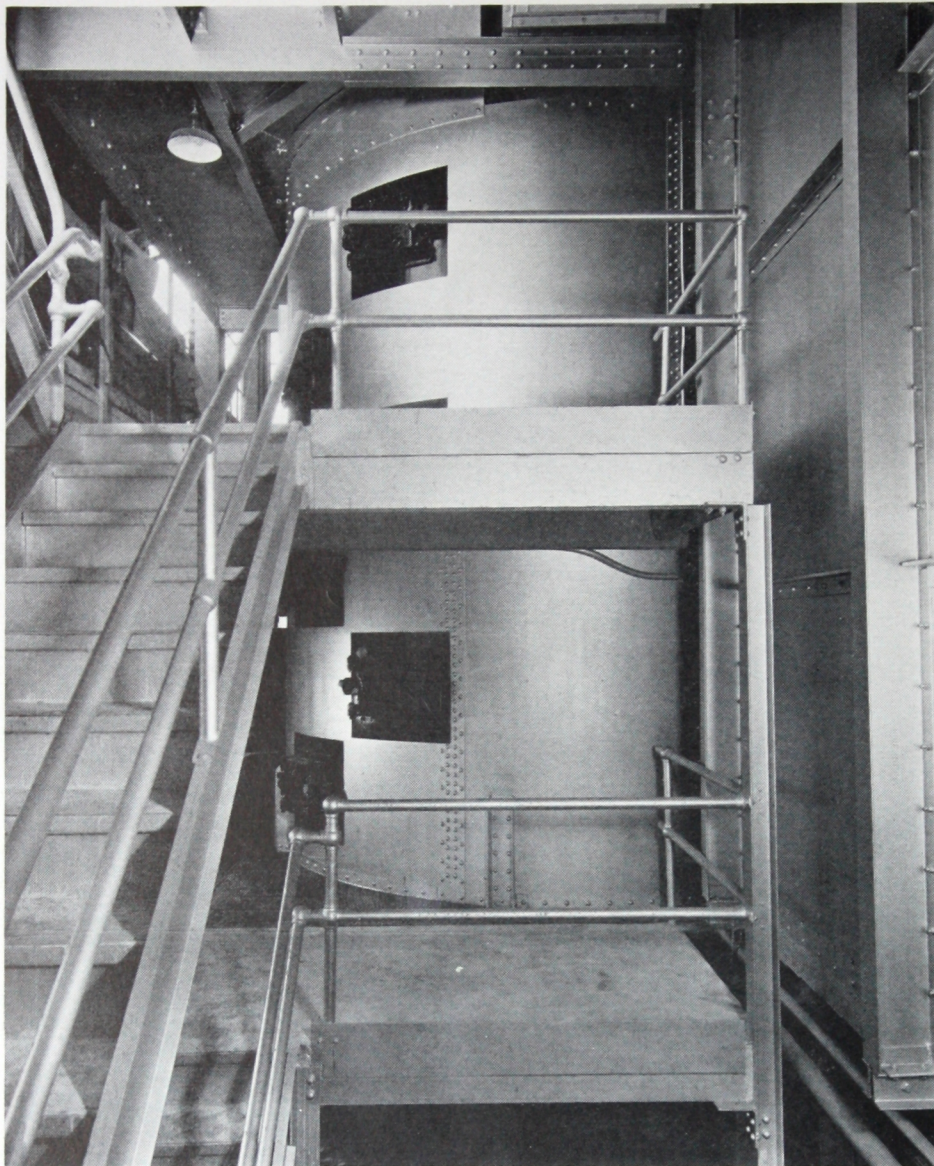
The 14'-3" O.D. four hearth NICHOLS HERRESHOFF Incinerator at Kaukauna may be seen

at left. This unit handles raw sludge from plain sedimentation or chemical precipitation.

The Kaukauna, Wisconsin, Sewage Disposal Plant was built in 1937. Sewage treatment is by plain sedimentation or chemical precipitation. Sludge storage tank with floating cover, but without provision for heating or digestion, may be seen at the right.

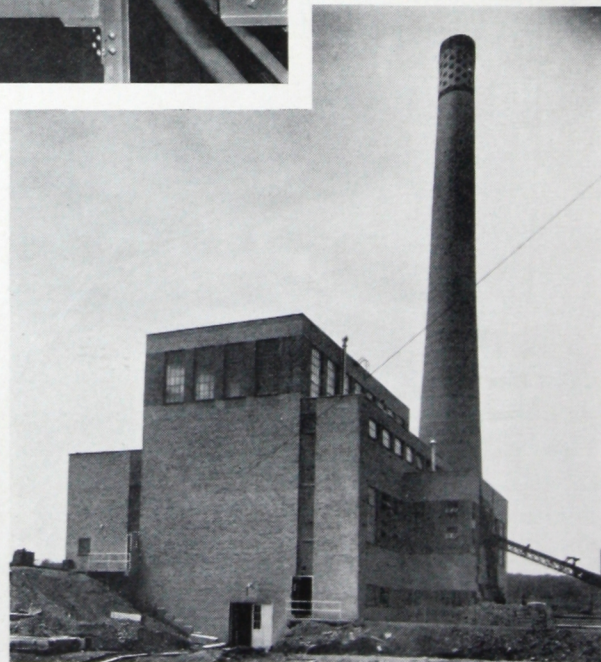




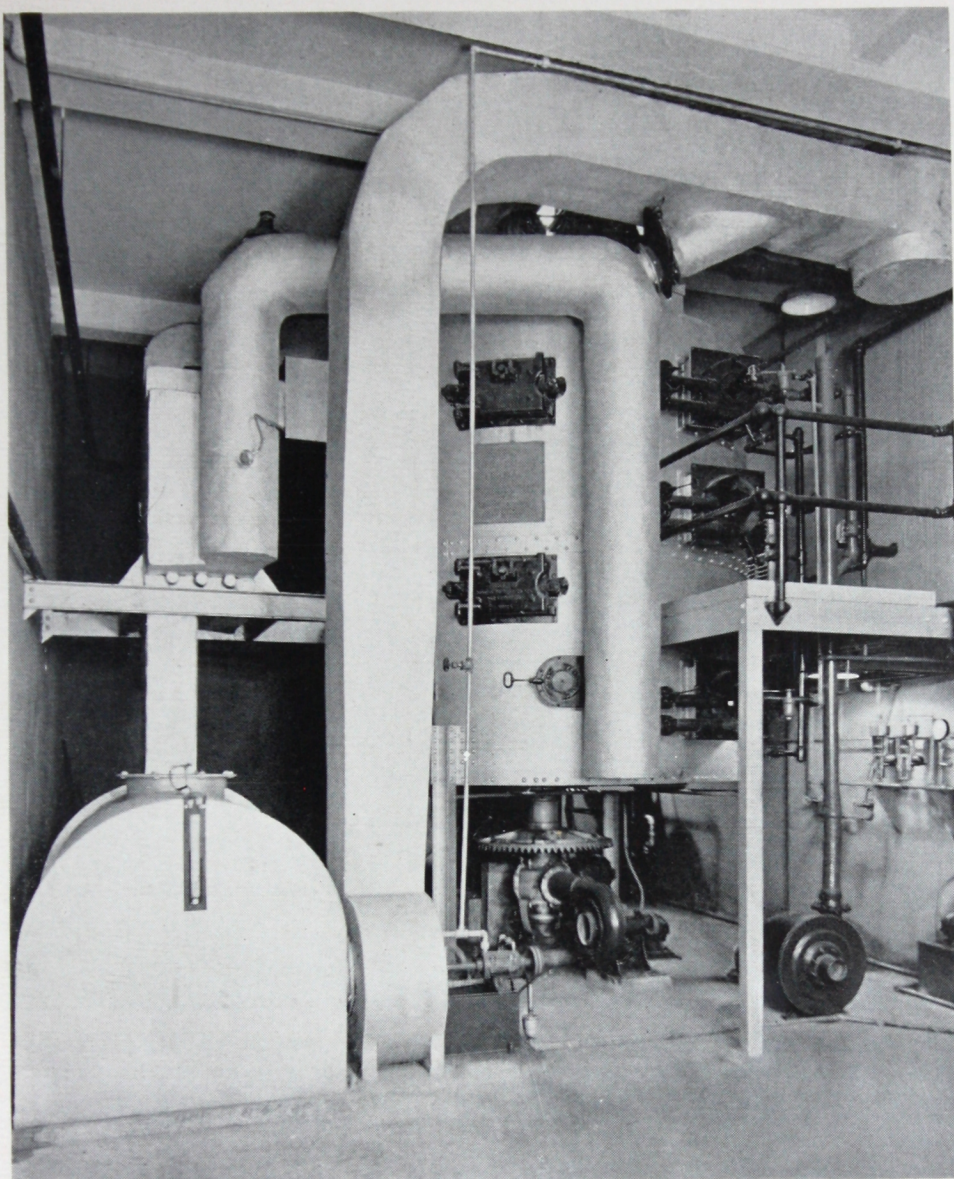


Partial view of the NICHOLS HERRESHOFF Incinerator-Dryer at Dayton.

The Dayton, Ohio, Incinerator Plant which includes a NICHOLS Basket Grate Refuse Incinerator and a NICHOLS HERRESHOFF Sewage Sludge Incinerator. At this plant provision is made for drying as well as incinerating sludge in the latter unit.

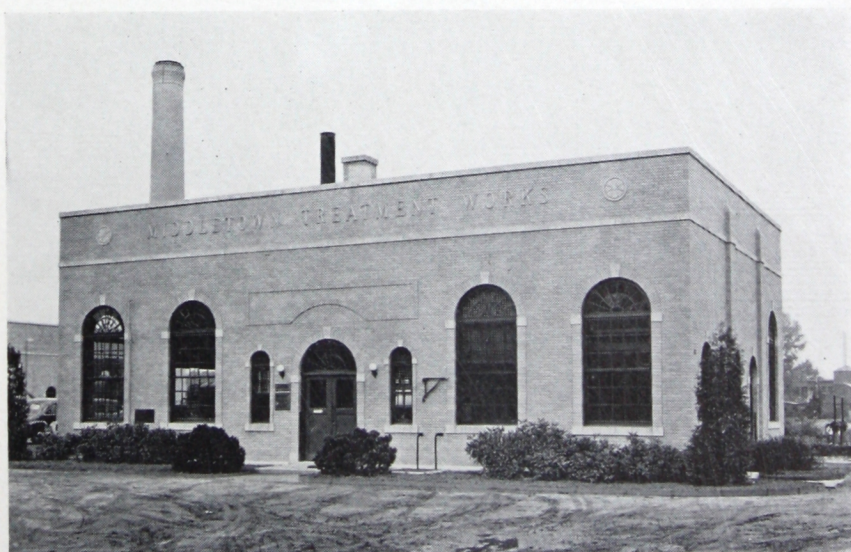




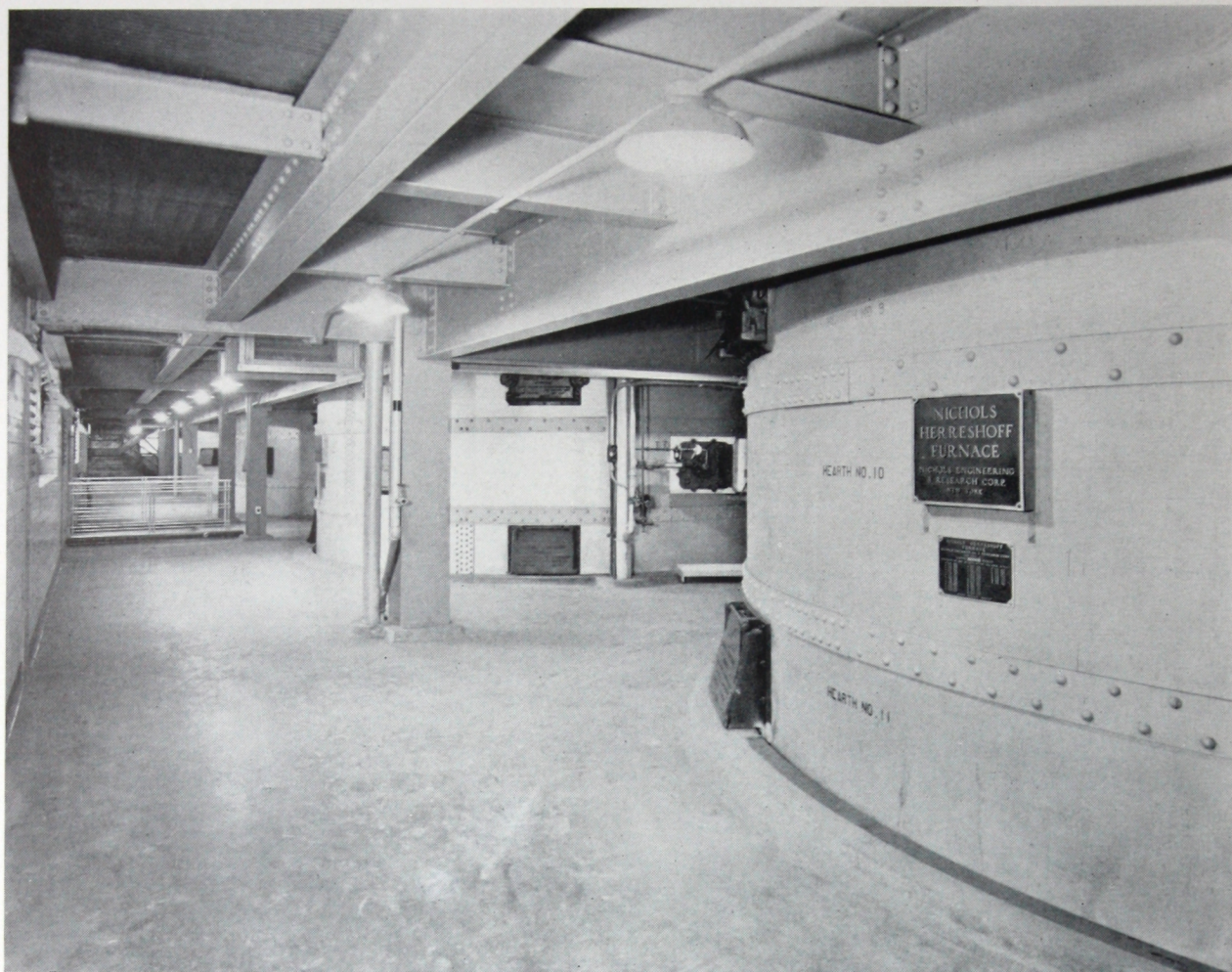


This small NICHOLS HERRESHOFF Incinerator has a diameter of 9'-3" and four hearths; was installed at Middletown, Conn., in 1937.

The attractive administration and control building of the Middletown, Conn., Sewage Treatment Works. Sewage from a population of 25,000 is treated by plain sedimentation.

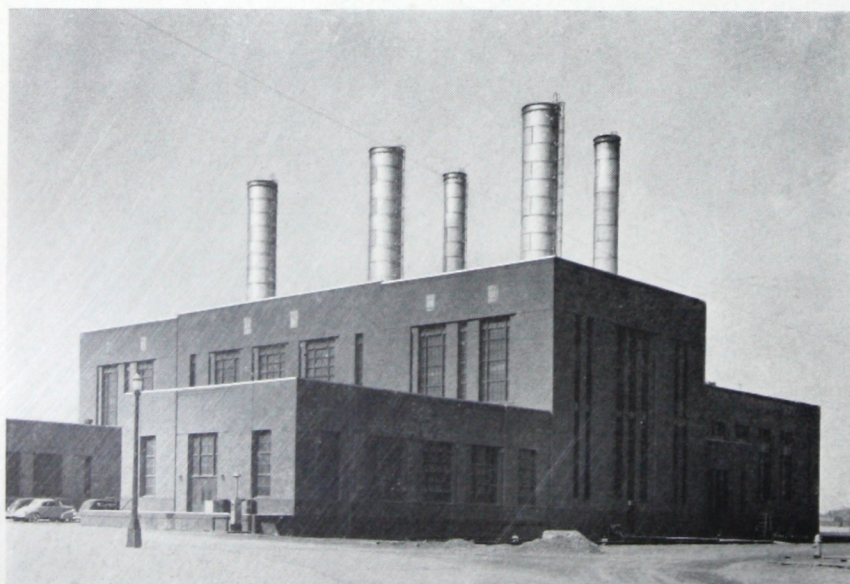






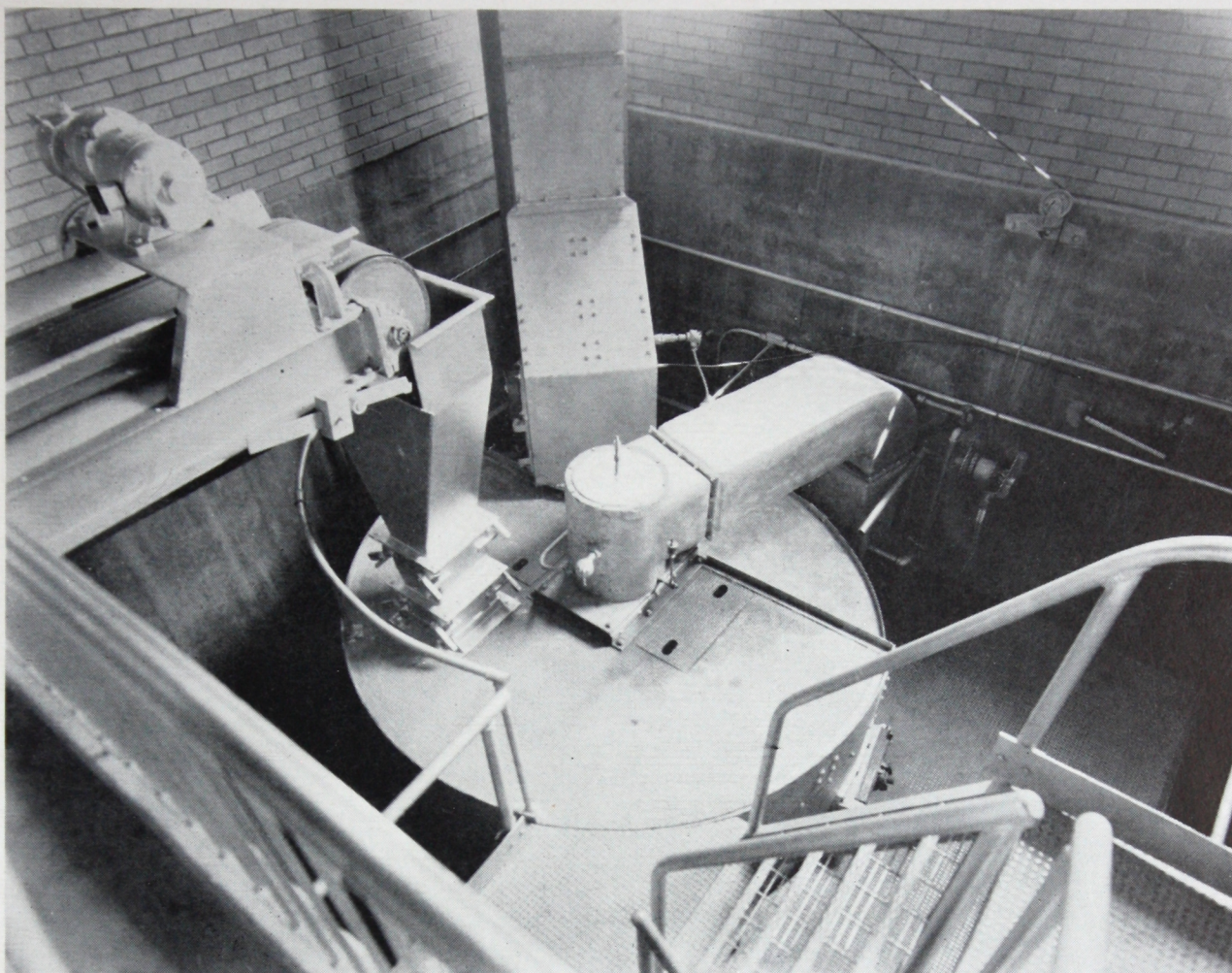
Raw, plain sedimentation sludge, screenings, grit and scum collected by the Detroit, Michigan, Sewage Treatment Plant are burnt in these four

22'-3" diameter, twelve hearth NICHOLS HERRESHOFF Incinerators. Only three hearths of each incinerator are visible at this floor level.



A battery of four NICHOLS HERRESHOFF Incinerators, having a combined capacity of 1200 tons per day, is installed in this massive sludge disposal building of the Detroit, Michigan, Sewage Treatment Plant.





Interior view of the Piqua, Ohio, Sewage Disposal plant showing the upper portion of the 9'-3" diameter, six hearth NICHOLS HERRE-

SHOFF Incinerator. This unit incinerates raw sludge produced by treatment of sewage from a population of 16,000.

Disposal of sludge by incineration gives the Piqua, Ohio, Sewage Plant a compact, attractive appearance in harmony with its surroundings. Piqua is one of many smaller communities using incineration for disposal of raw sludge.







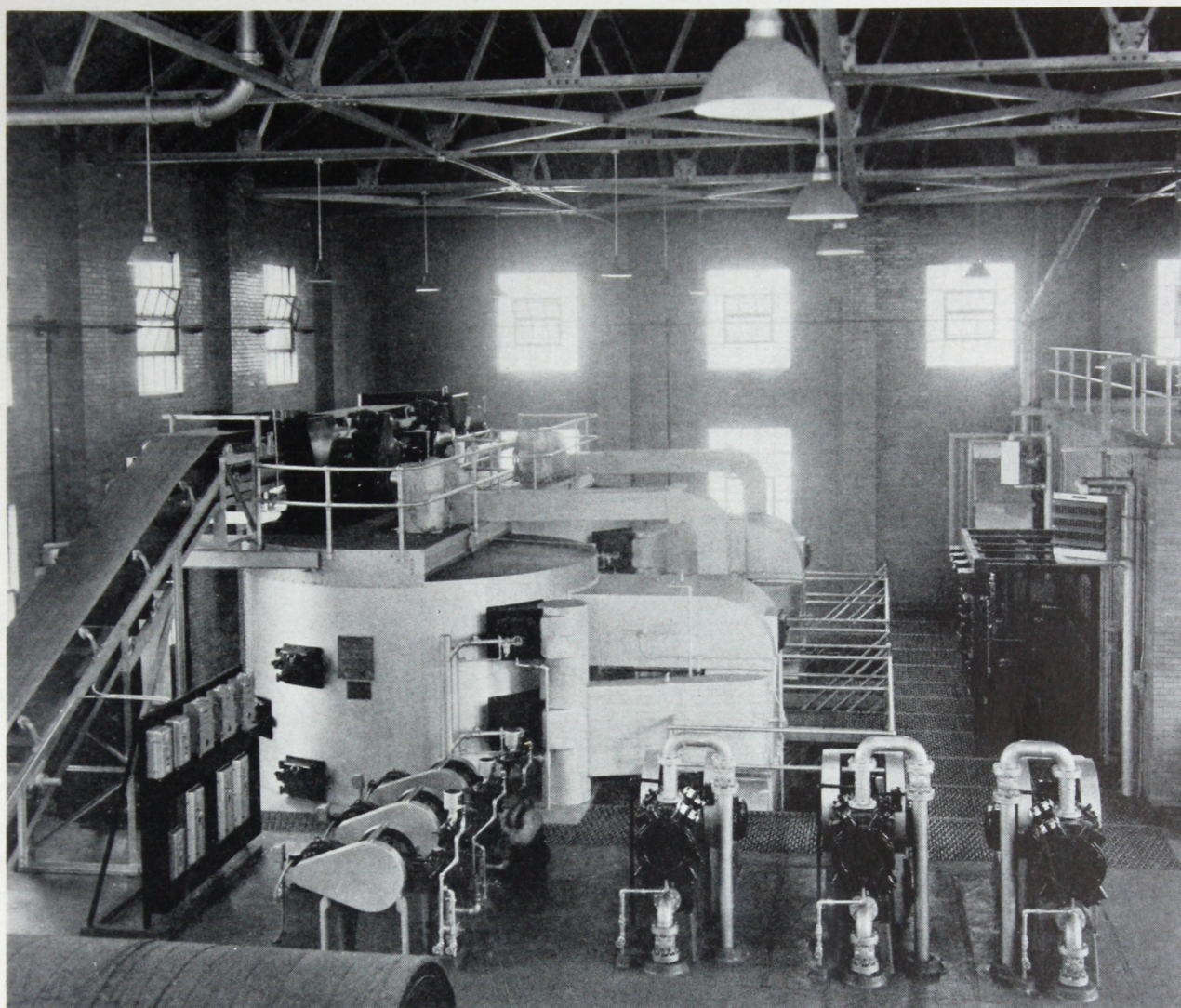
Four 18'-9" diameter, eight hearth NICHOLS HERRESHOFF Incinerators installed at Cleveland's "Southerly" plant. These units, together

with those at the "Westerly" plant, incinerate sludge produced by the complete treatment of sewage from a population of 1,480,000.



This imposing building houses the vacuum filters and incinerators at the Cleveland, Ohio, "Southerly" Disposal Plant. Four large NICHOLS HERRESHOFF Incinerators handle the sludge from both the "Southerly" and "Easterly" plants.

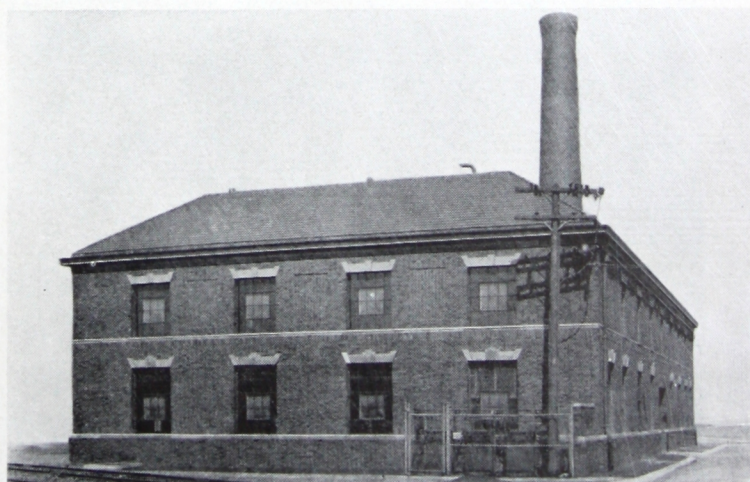




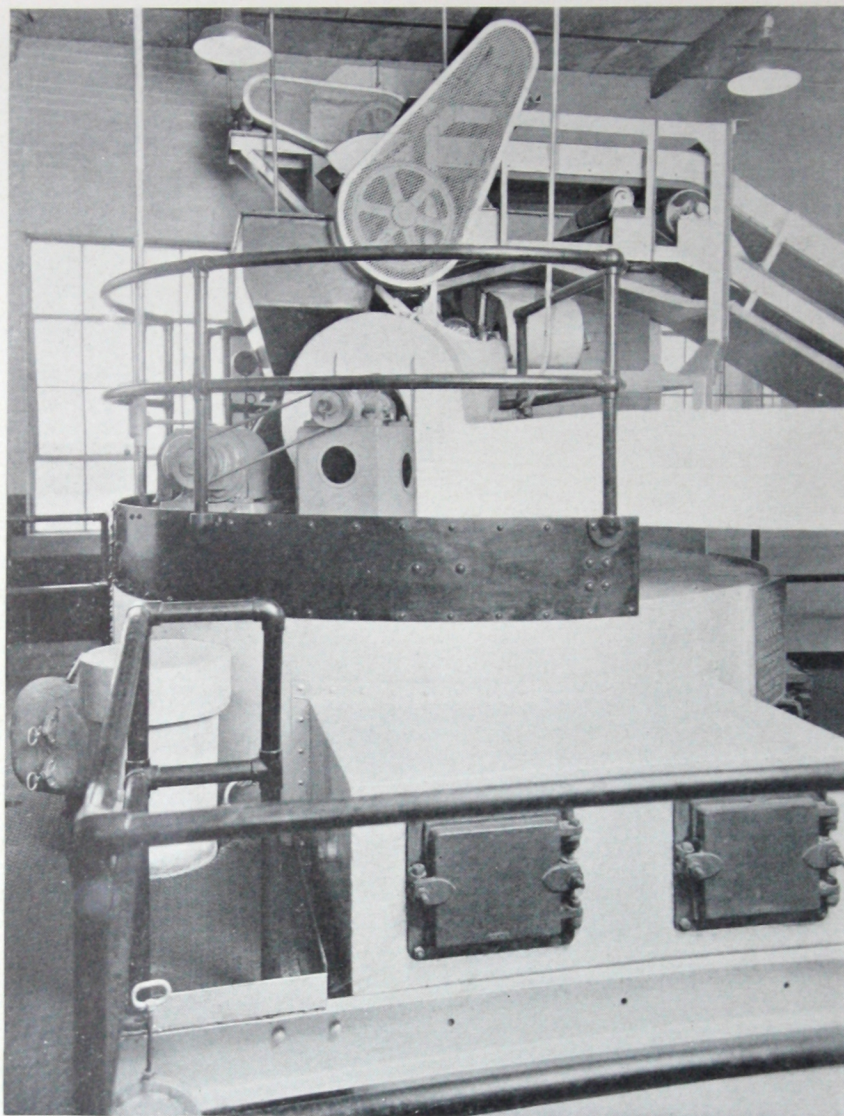
Duplicate 14'-3" diameter six hearth NICHOLS HERRESHOFF Incinerators at the Cleveland "Westerly" Plant. This interior view of the sludge

disposal building clearly shows the streamlined layout largely responsible for the "clock-like" efficiency of this plant.

The Sludge Disposal Building of the "Westerly" Sewage Disposal Plant, Cleveland, Ohio. The incinerators installed here have been in operation since 1937.





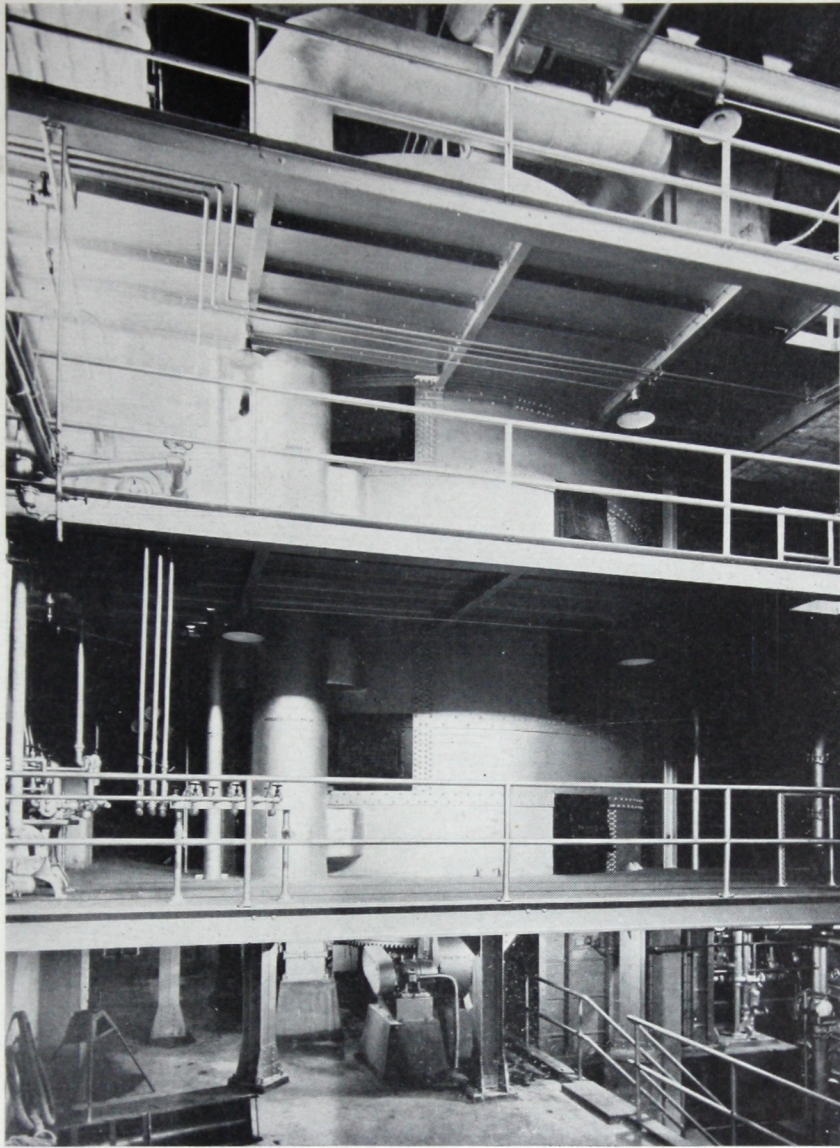


The 9'-3" diameter, six hearth NICHOLS HERRESHOFF Incinerator at Greece, which burns undigested primary and activated sludge.



This modern, attractive Sewage Disposal Plant is owned by the City of Greece, N. Y. Sewage is treated by the activated sludge process.

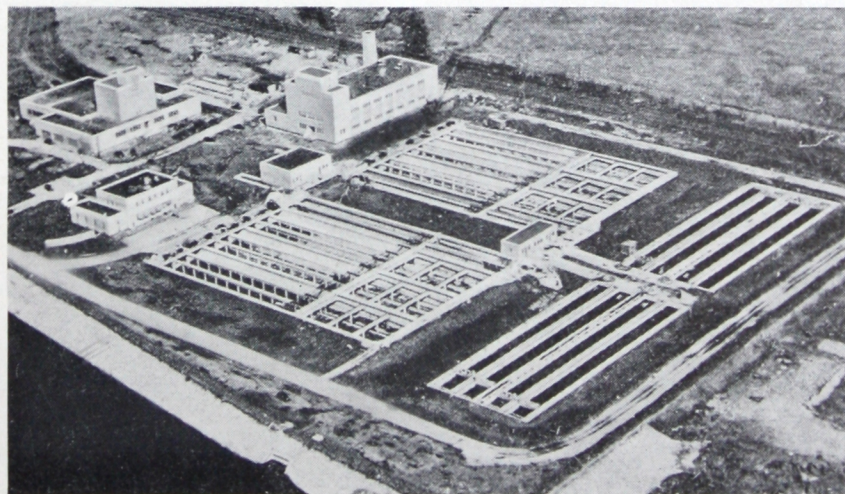




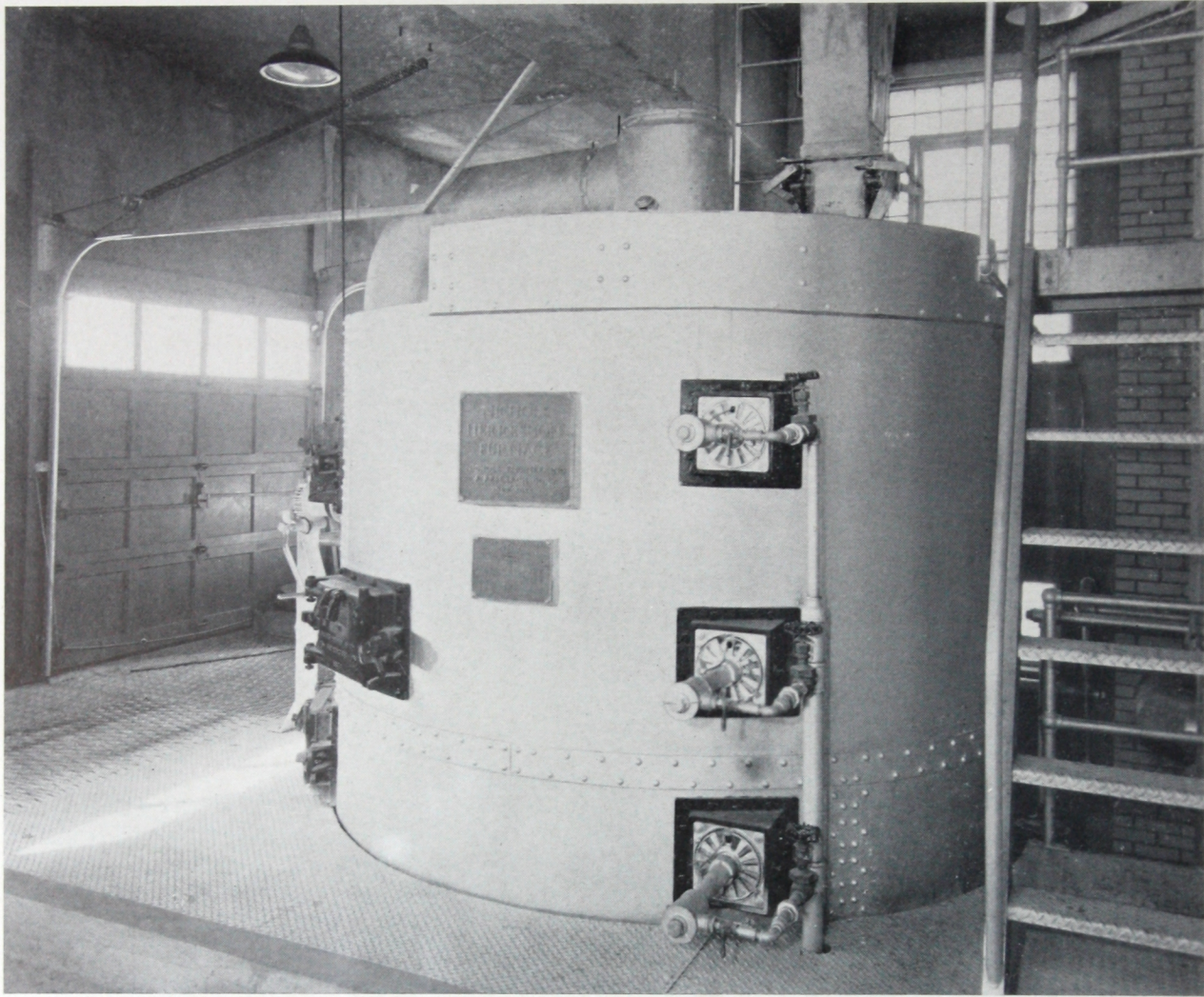
One of a battery of three NICHOLS HER-RESHOFF Incinerators in use by the Twin Cities.

Raw sludge from a population of over 700,000 is incinerated.

The Sewage Disposal Plant of the Minneapolis-St. Paul Sanitary District uses plain sedimentation or chemical precipitation with incineration of raw sludge.





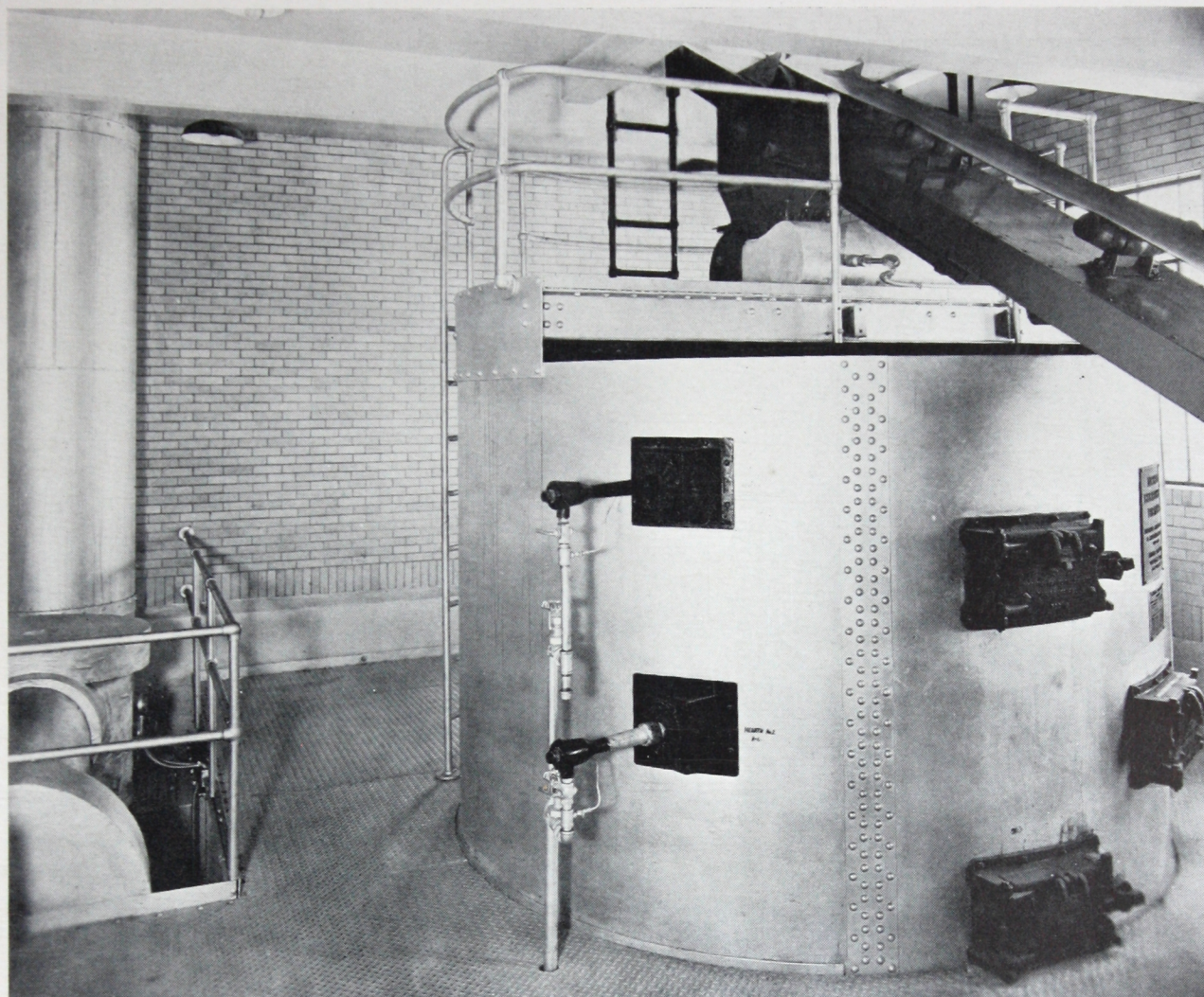


Neat, workmanlike design and easy accessibility are shown by this small NICHOLS HERRESHOFF Incinerator at Ashland, Ohio.



The Ashland, Ohio, Sewage Disposal plant comprises primary sedimentation, trickling filters and incineration of raw sludge: serves a population of 12,000.

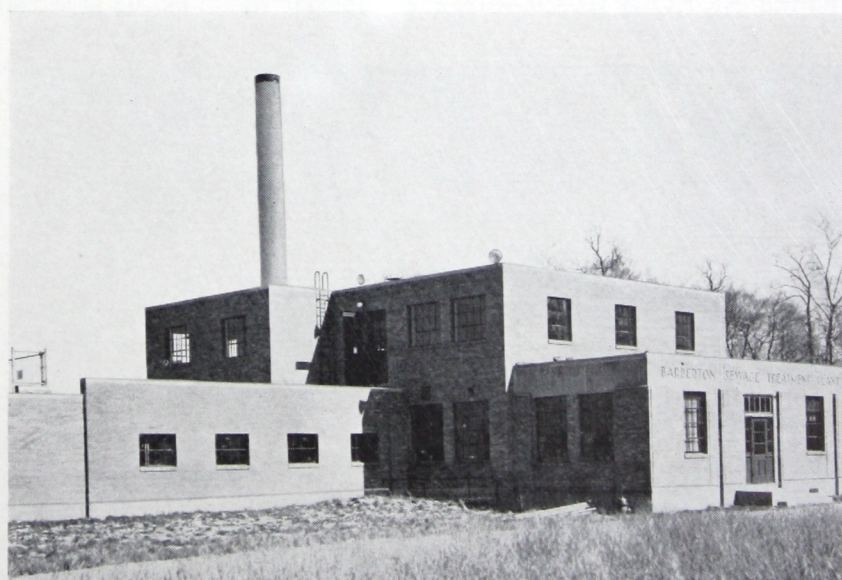




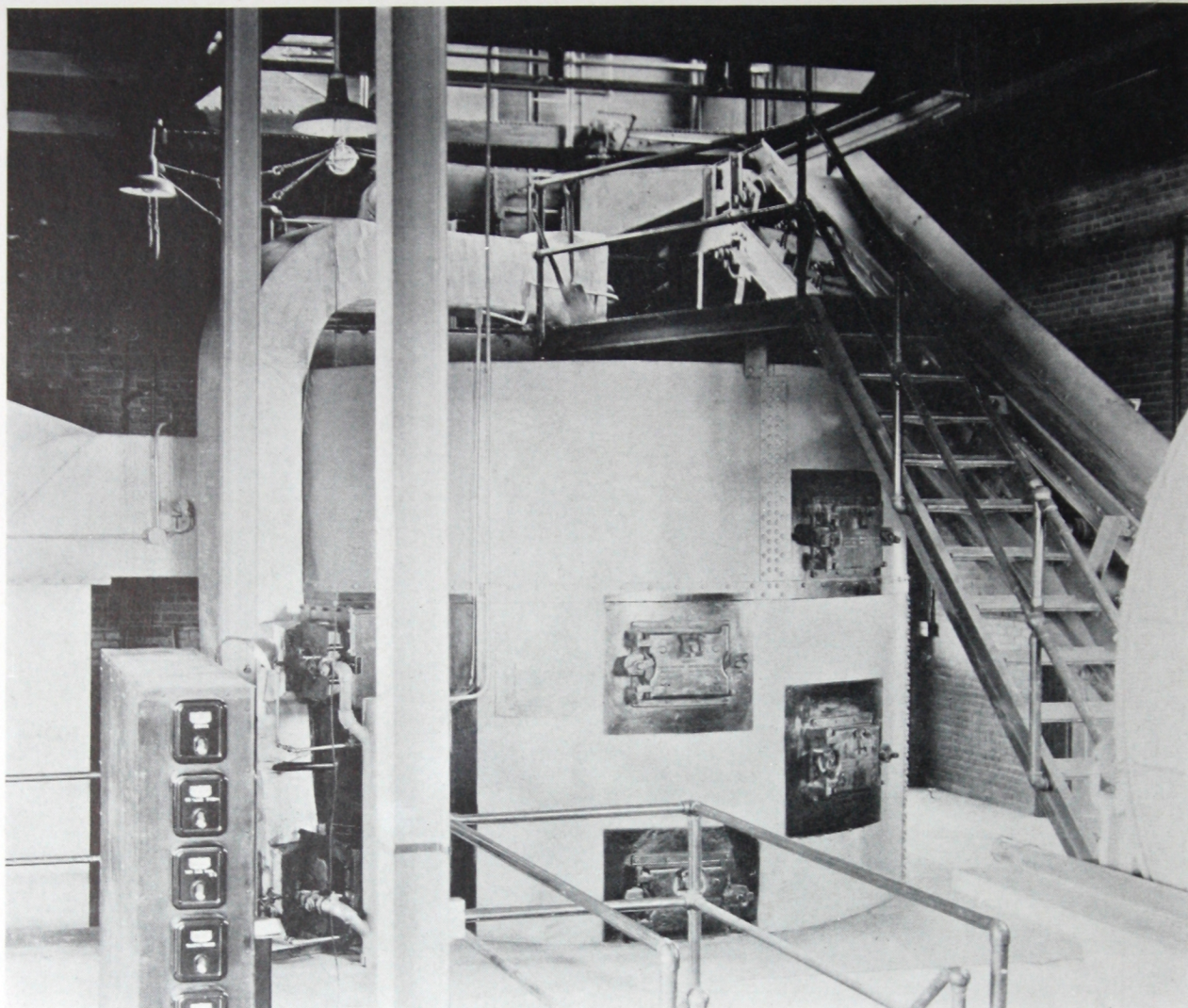
This 10'-9" diameter, six hearth incinerator at Barberton, burns raw sludge. A city of 24,000 population, Barberton is typical

of many smaller municipalities using NICHOLS HERRESHOFF Incinerators for complete disposal of undigested sewage sludge.

The Barberton, Ohio, Sewage Plant, pictured here, was placed in operation during 1938. Sewage is treated by plain sedimentation or chemical precipitation. Raw sludge is disposed of by incineration.







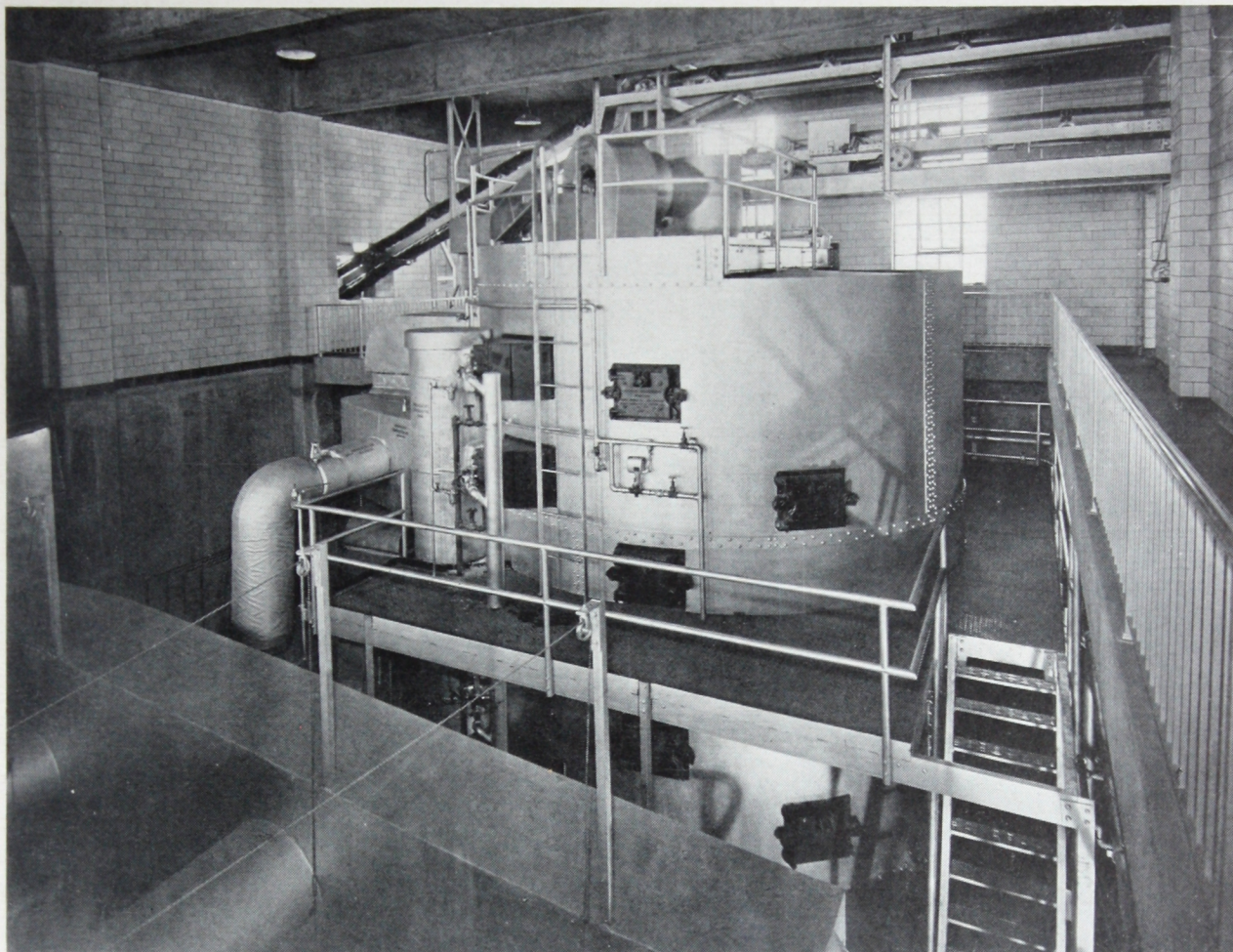
View of the upper half of the 14'-3" O.D. eight hearth NICHOLS HERRESHOFF Incinerator at

New Britain. Raw sludge from a population of 68,000 is incinerated in this unit.



The Bio-Chemical sewage treatment method is used at the New Britain, Connecticut, Disposal Plant seen here. The NICHOLS HERRESHOFF Incinerator at this plant has been in regular service since 1936.

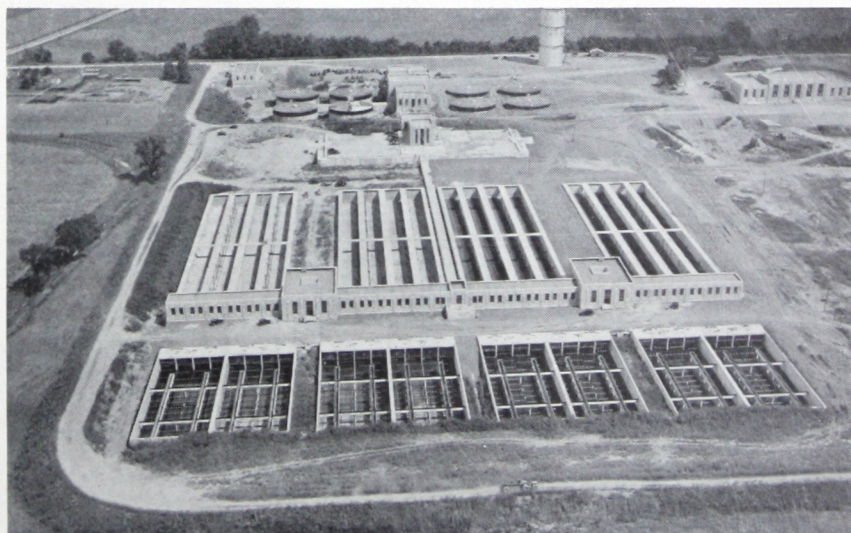




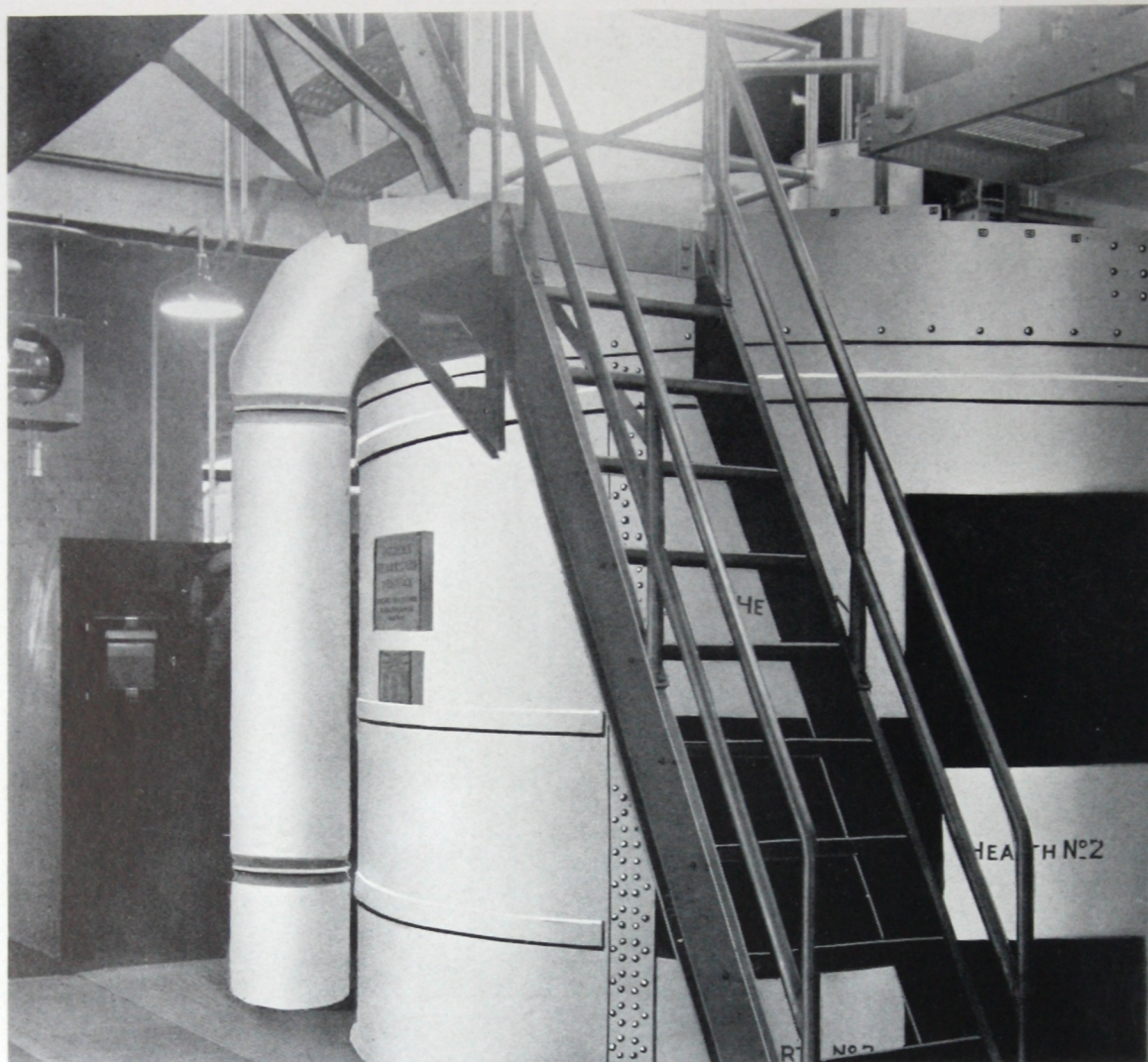
The 16'-9" O.D. six hearth NICHOLS HERRE-SHOFF Incinerator at Columbus is installed in

the boiler room and the operator takes care of both pieces of equipment.

An aerial view of the Sewage Treatment Plant, Columbus, Ohio. Front to back can be seen: final settling tanks, operating gallery, aeration tanks, primary settling tanks and incinerator building at extreme rear with digesters on either side. Native limestone construction makes buildings harmonize with the surrounding country-side.







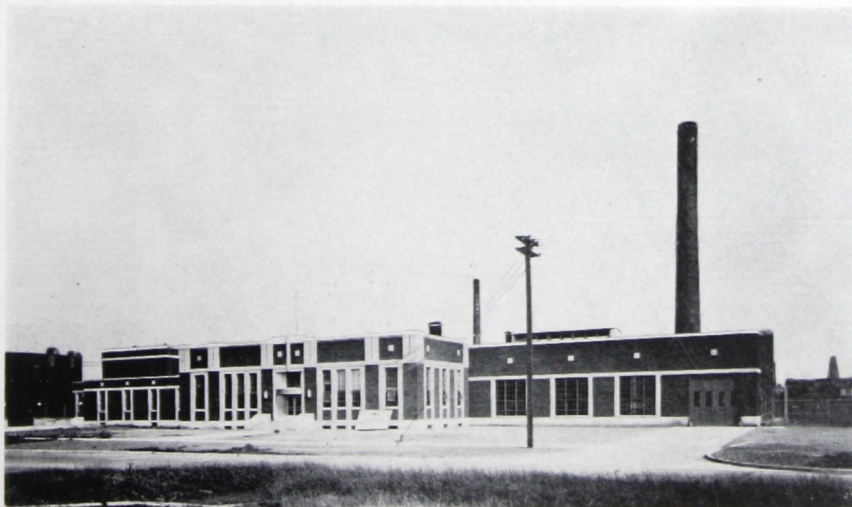
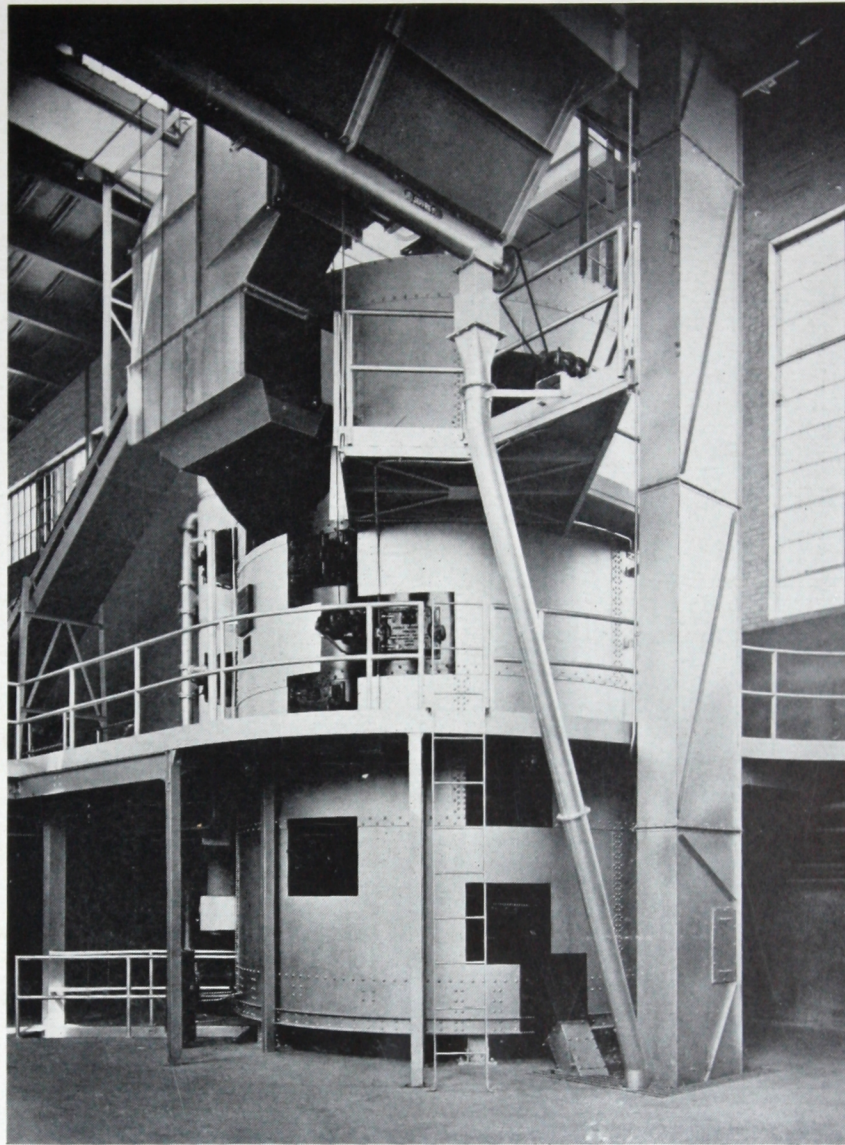
Partial view of the 14'-3" diameter, 6 hearth NICHOLS HERRESHOFF Sewage Sludge Incinerator at the New Haven Boulevard Plant.



Exterior view of the Boulevard Sewage Disposal Plant, New Haven, Connecticut. This plant contains one NICHOLS HERRESHOFF Sewage Sludge Incinerator.

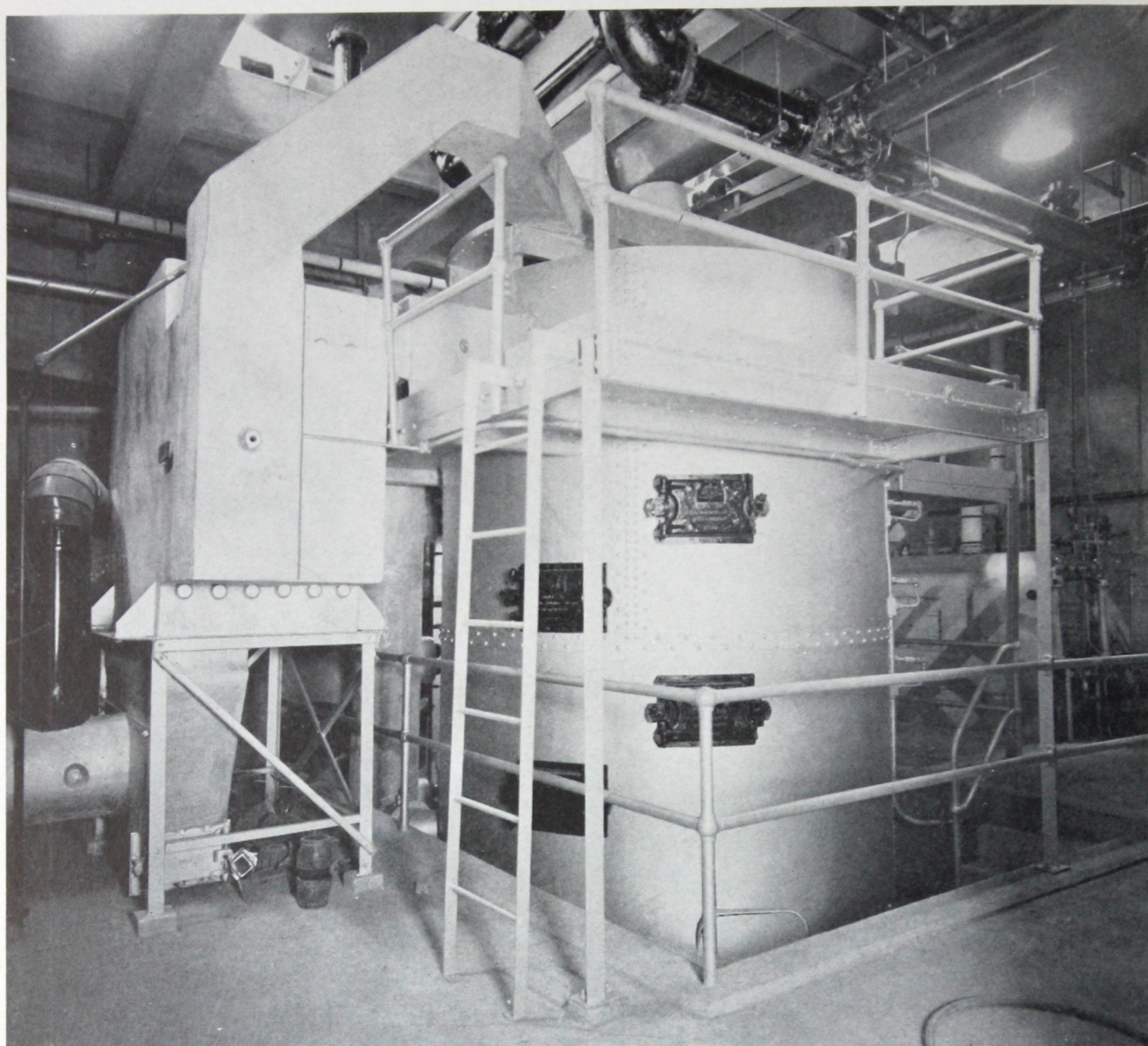


Simplicity of design and compact, workmanlike construction are clearly exhibited by this view of the Wyandotte incinerator, installed for the Wayne County Board of Road Commissioners.



This handsome administration and control building at the Wyandotte, Michigan, Sewage Disposal Plant was completed in 1939. Liquid sludge is trucked here from neighboring cities and disposed of, together with Wyandotte sludge, in one 16'-9" diameter, eight hearth NICHOLS HERRESHOFF Incinerator.





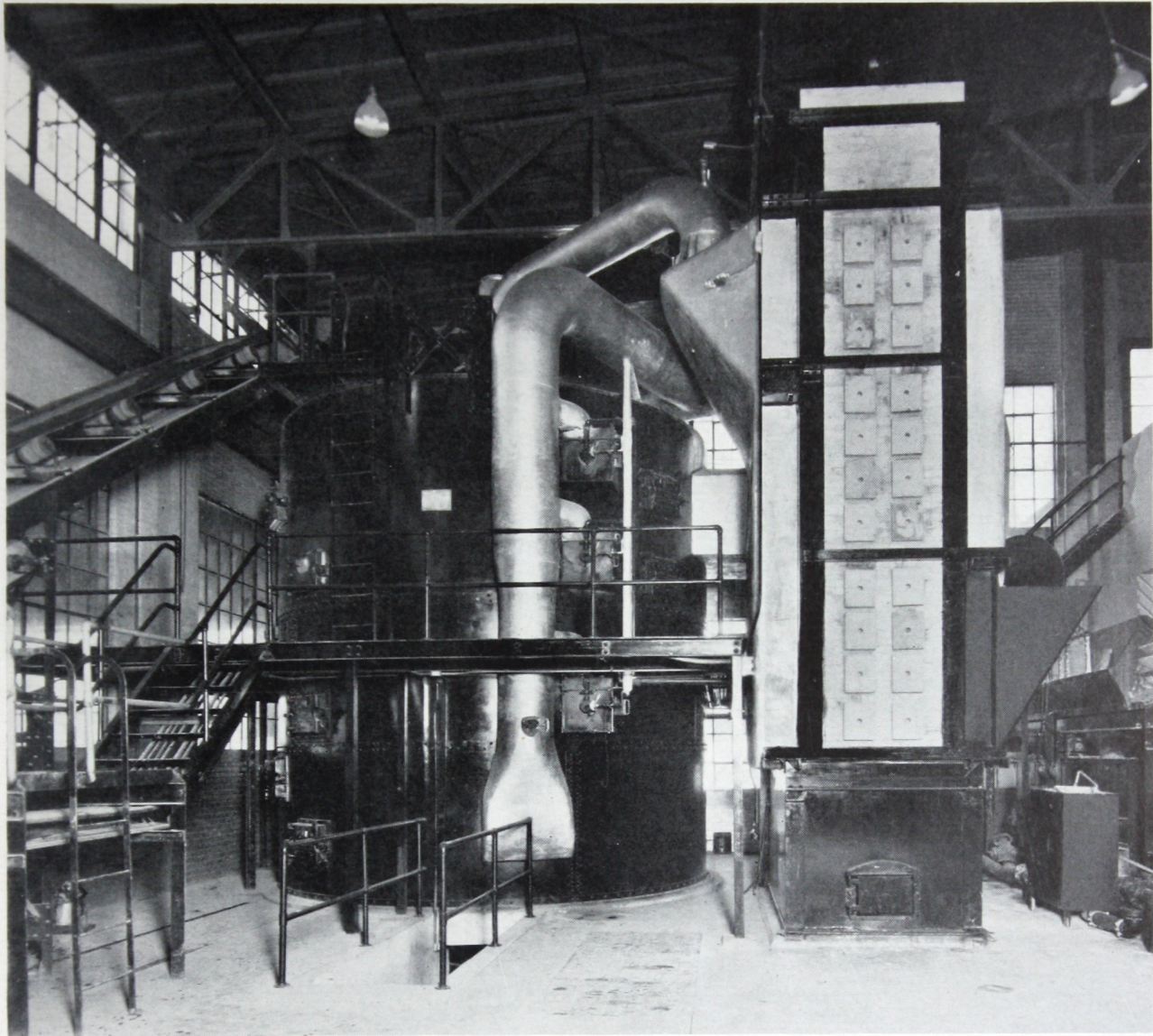
The 10'-9" diameter, six hearth, NICHOLS HERRESHOFF Incinerator at Auburn is designed for raw sludge incineration.

The vacuum filters are located on the floor above and filter cake, stored in a hopper between the filters, is fed to the incinerator by a variable speed screw conveyor.



The Auburn, N. Y., Sewage Treatment Works has been in regular operation since 1936, serving a population of 36,000. Sewage is treated by plain sedimentation or chemical precipitation and raw sludge is incinerated.





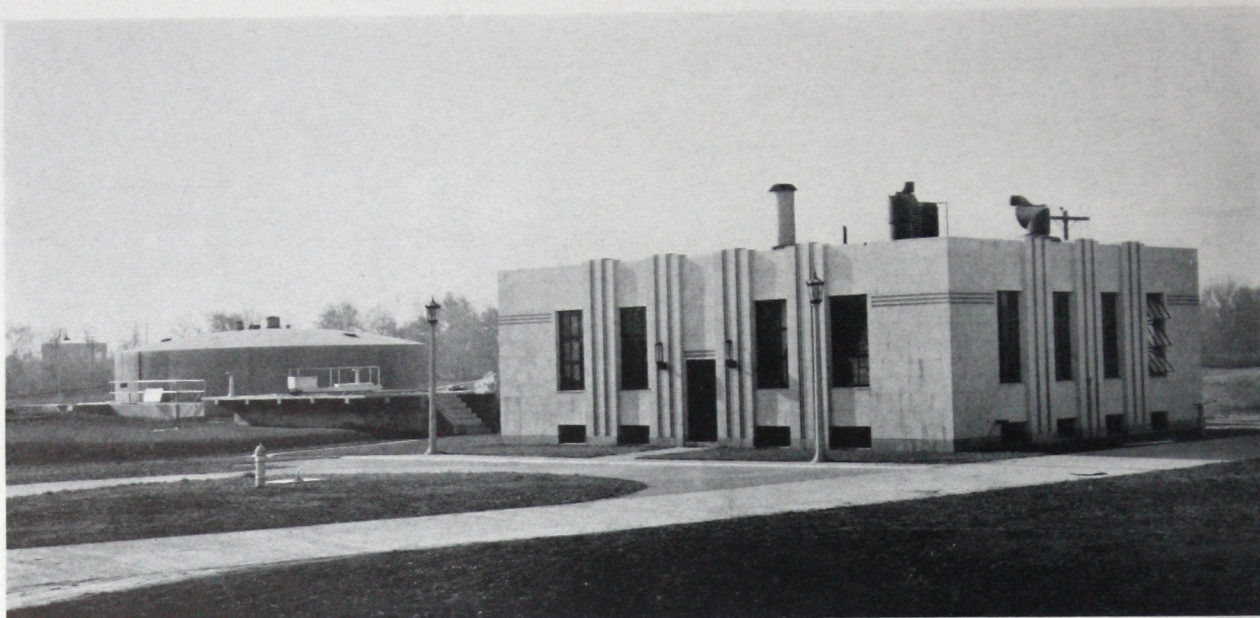
The first full scale, regular duty, sewage sludge incinerator ever installed is this 16'-9" diameter,

six hearth NICHOLS HERRESHOFF Incinerator, built for the City of Dearborn, Michigan, in 1934.

This beautiful colonial style building houses the "West Side" Sewage Disposal Plant at Dearborn, Michigan. This plant employs chemical treatment of sewage; magnetite effluent filters; vacuum filtration and incineration of raw sludge from both the "West" and "East Side" plants.







The Kokomo, Indiana, Sewage Disposal Plant handles sewage from a population of 33,000; comprises primary sedimentation followed by trickling filters.

The 9'-3" O. D. six hearth unit installed in 1936 is the second NICHOLS HERRESHOFF Sewage Sludge Incinerator for regular municipal service.



This attractive, concrete building looks like a country club; is really the Sewage Plant, LaPorte, Indiana. One 9'-3" diameter, four hearth

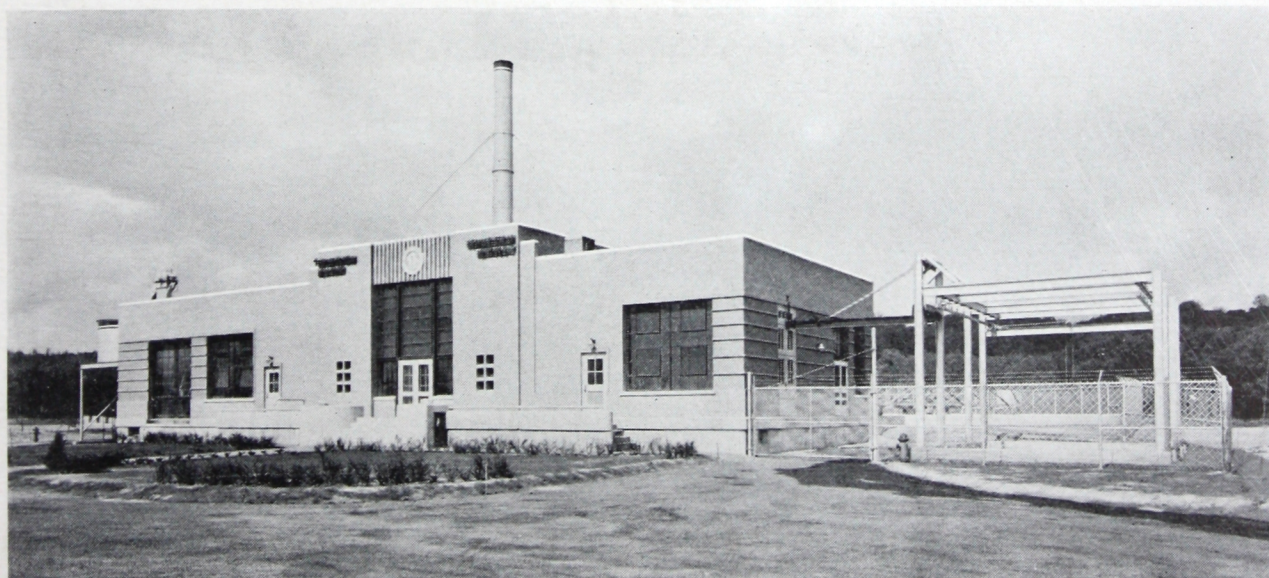
NICHOLS HERRESHOFF Incinerator here serves a population of 16,000; has been in operation since 1937.





This attractively modern administration and control building of the Conshohocken, Pa., Sewage Treatment Plant houses a 10'-9" four hearth

**NICHOLS HERRESHOFF** Incinerator. Raw sludge from plain sedimentation or chemical precipitation is incinerated at this plant.



Elmira, N. Y., a city of 48,000 population is served by this modern Sewage Disposal Plant. Sewage is treated by plain sedimentation or chemical

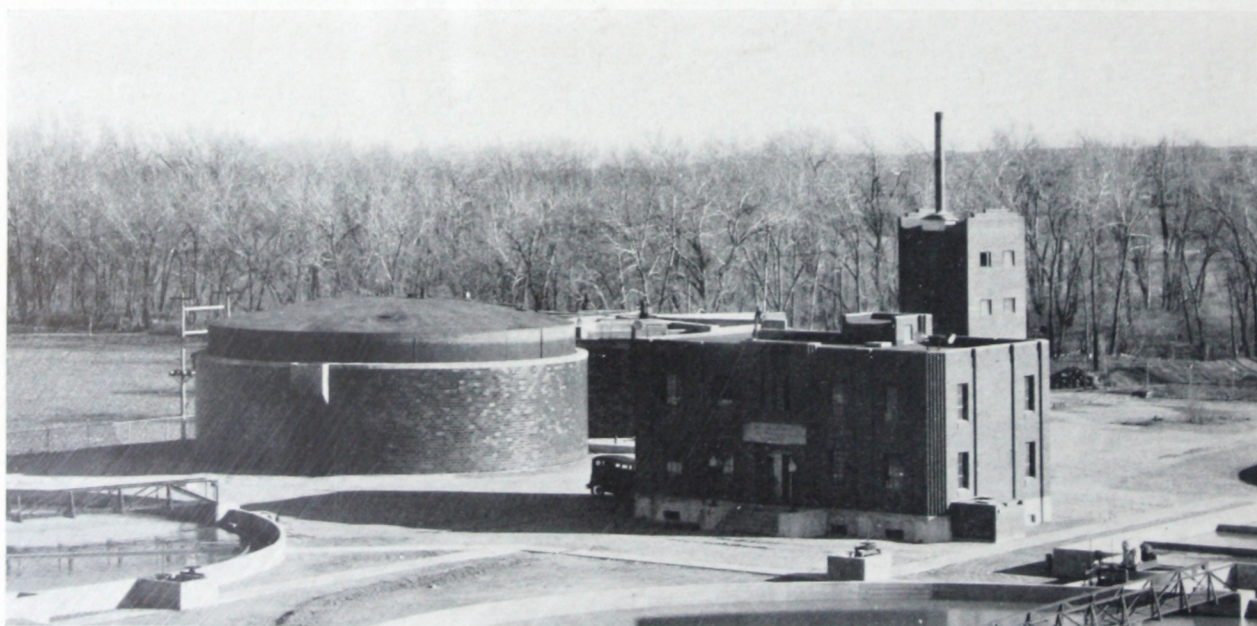
precipitation. The raw sludge is disposed of in one 14'-3" O.D. four hearth **NICHOLS HERRESHOFF** Incinerator.





The East Street Sewage Disposal Plant, New Haven, Connecticut, which incorporates one 14'-3" diameter 6-hearth NICHOLS HERRESHOFF

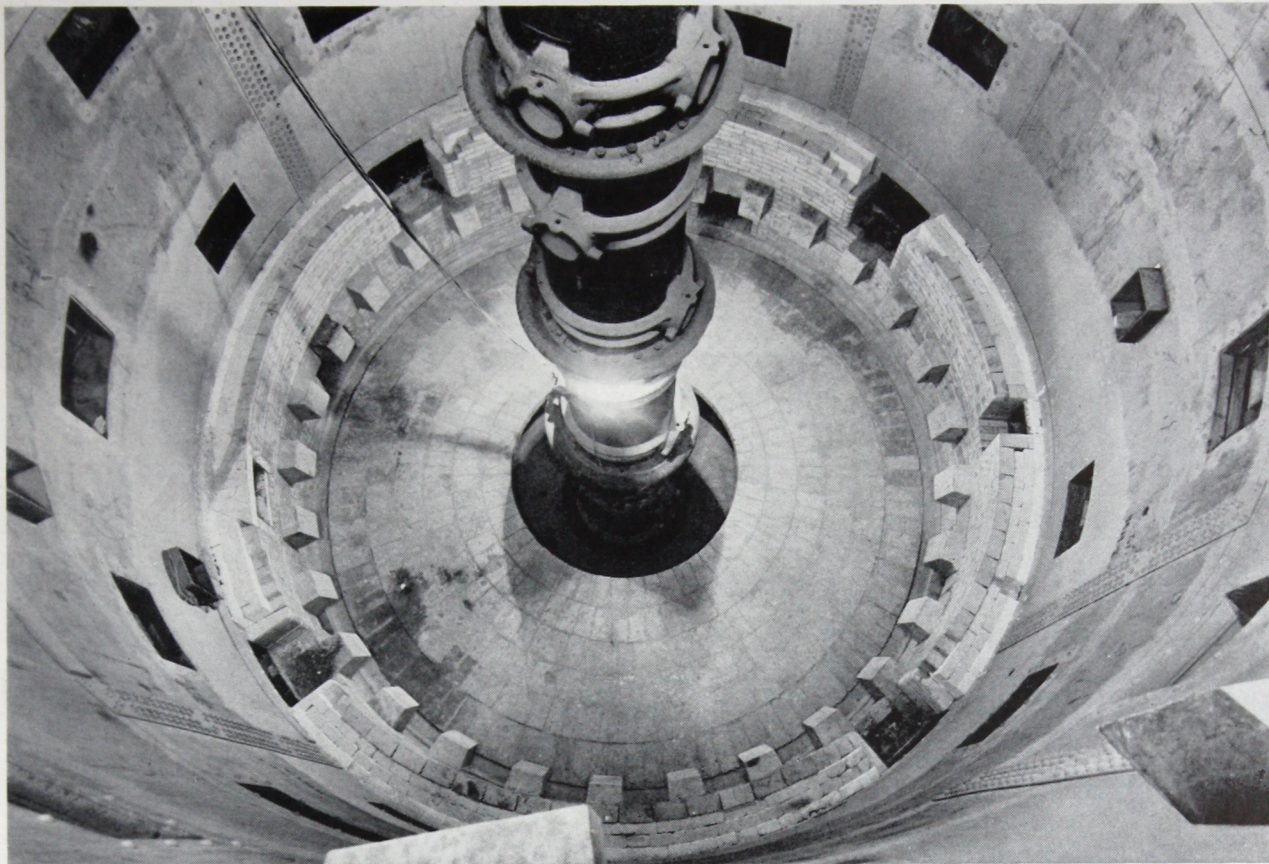
Sewage Sludge Incinerator. Complete sanitary disposal of sludge in this unit takes the place of sludge barging at the East Street Plant.



The Colorado Springs, Colorado, Sewage Disposal Plant, which incorporates one 9'-3" diameter 6 hearth NICHOLS HERRESHOFF Sludge

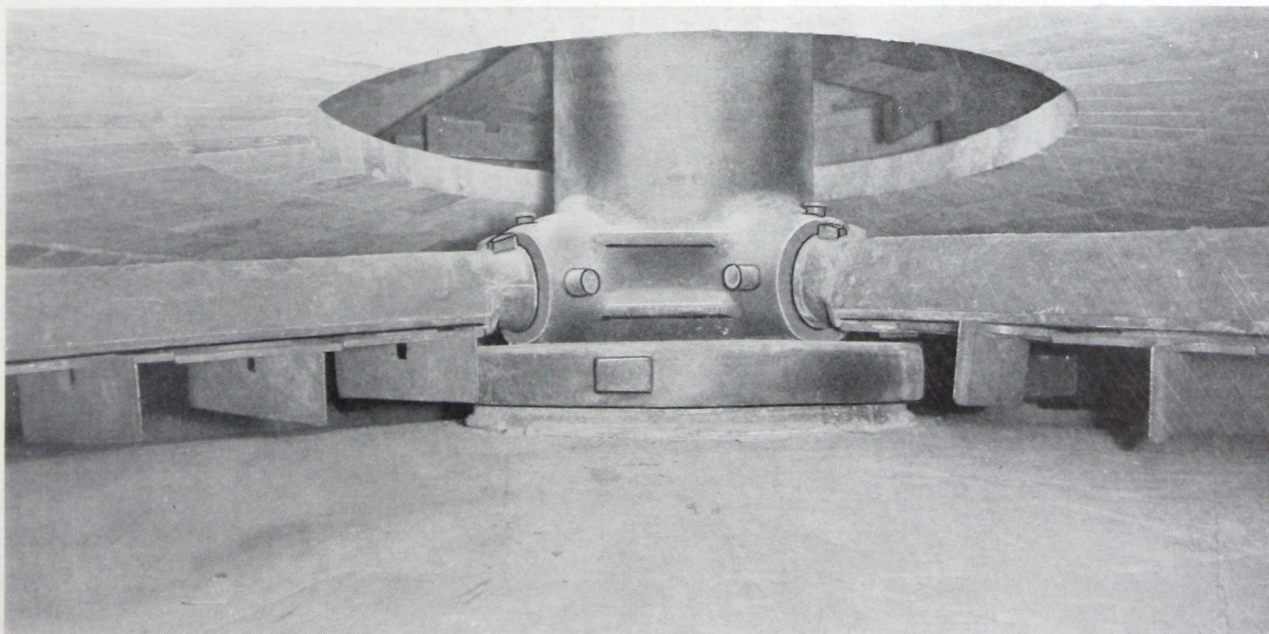
Incinerator. This unit has been in regular service since 1936, serving a population of 33,000.





This photograph of a large NICHOLS HERRESHOFF Incinerator taken during construction clearly shows the massive construction of the towering central shaft. An "IN" discharge

hearth has just been laid. The skewbacks for supporting the next "OUT" discharge hearth may be seen protruding through the furnace wall.



View of "OUT" discharge hearth showing rabble arms and teeth and the underside of an "IN"

discharge hearth above. Note paper thin joints between hearth blocks indicating perfect, refractory masonry.



## **PRODUCTS**

- Nichols Herreshoff Sewage Sludge Incinerator
- Nichols Basket Grate and Continuous Grate Refuse Incinerators
- Nichols Herreshoff Multiple Hearth Roasting and Calcining Furnace
- Nichols Freeman Flash Roaster
- Nichols Freeman Vortrap Classifier

## **EUROPEAN AGENTS**

### **Vortrap Classifier:**

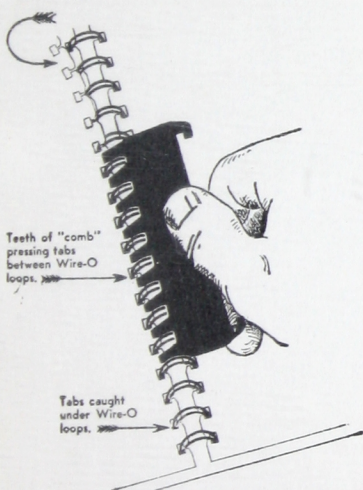
- France—Edouard Hery, Paris
- Sweden—A/B Celleco, Uppsala
- England—Walmsleys (Bury) Limited, Bury Lancashire

### **Roasting and Calcining Furnace**

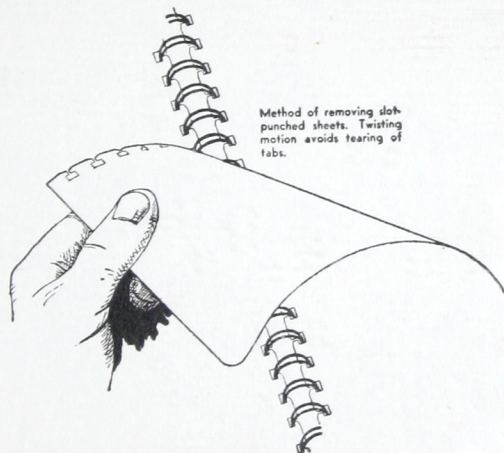
- Belgium—Societe Generale des Minerais, Brussels
- Sweden—A/B Celleco, Uppsala
- England—Huntington, Heberlein & Co., Limited, London



Slot-punched sheet  
before "comb" has  
pressed tabs between  
Wire-O loops.



Method of removing slot-  
punched sheets. Twisting  
motion avoids tearing of  
tabs.



**WIRE-O Binding**  
PATS. 2,075,988 - 2,112,389 - 2,114,543  
Other Patts. Pending



